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Volume 4, No. 8 Circulation of this issue 30,506

YOU CAN BE **SURE**.. IF IT'S
Westinghouse

Submerged in 6 ft. of Water..Open Motor Pumps Sump Dry

When water rose accidentally in a sump of an eastern plant, an open Life-Line motor was covered by six feet of water. Someone pressed the starter, and the Life-Line pumped the sump dry. Outside of being covered with a thick coating of

Can your *PUMPS* use this Life-Line motor stamina?

We certainly do not recommend open motors be operated under these conditions—in fact, we say DON'T DO IT! But this actual example illustrates the real stamina built into Life-Line motors—stamina resulting from improved materials and manufacturing methods.

Take the stator, for example. Coils are wound of Tufvar wire—wire you can pound with a sledge, tie into knots, without disturbing the insulation. Pear-shaped slots enable coils to be slipped into place without forcing. A fiber wedge closes top of slot, seals against dirt and moisture. Multiple dips and bakes in Thermoset varnish give the stator a tough flexible film, resistant to oil, moisture, acid and alkali. That's why, in the above example, there was no winding short-out—even under water.

It costs no more to get this extra motor stamina. Simply specify Life-Line as the drive for your equipment. Ask your local Westinghouse representative for details and a copy of booklet B-3842, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-21573

If you figure LIFE-COSTS . . . you'll figure LIFE-LINE

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Life-Line
Motors

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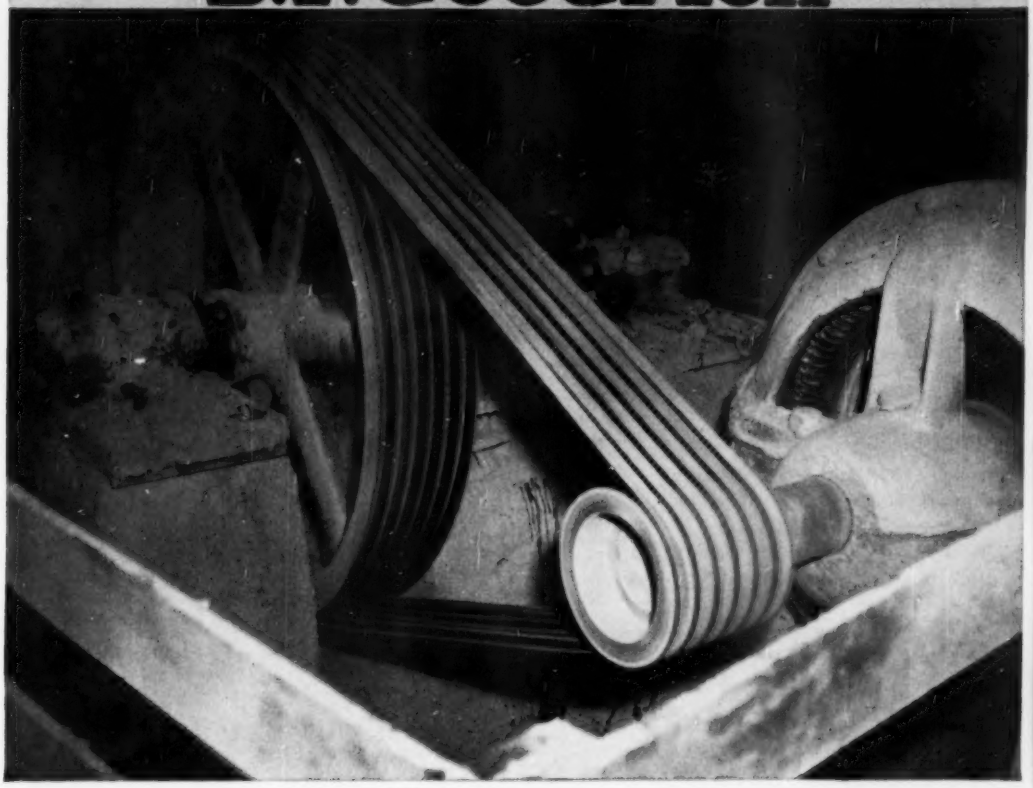

Where a change to grommet V belts saved $100 a month

THIS drive turns a ball mill containing 22 tons of steel balls, water and ore that grind until the mineral can be separated. Six ordinary belts weren't enough. They were falling to pieces from overwork.

But there wasn't space to expand, and redesigning the drive would cost $800. Ordinary belts lasted only 5 or 6 weeks, replacement costs were over $100 a month. B. F. Goodrich grommet multiple-V belts were installed, are in their sixth month of service, still in good condition. Here's why the grommet construction reduces V belt costs:

No cord ends — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip — Because a grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B.F.Goodrich has the grommet! — No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294). At present made in D and E sections only. See your local B. F. Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B.F.Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

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B.F.Goodrich

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'ROUND ABOUT with the editors in field and office

The Korean Situation Forebodes Change in Policy and Practice

NOWHERE else in this issue is the Korean situation mentioned. We are not trying to ignore a serious problem nor overlook its possible far-reaching consequences. The fact is that, as a monthly publication, we go to press weeks before you receive your copy and have just learned of the invasion.

As editors, we know from department heads in Washington, something of top level planning. As active reservists, we also know that much of this planning activity has been implemented at the operating level. We know that some companies have made plans for producing strategic war materials so detailed that the plant engineers could start on the conversion overnight.

As ex-GI's we also know that excellent plans made prior to World War II were never put into effect because there was no M-Day alarm; we eased into the war gradually from 1939 on to Pearl Harbor.

As plain citizens, we know the armed services are far under strength. We know that steel and some other materials are already short. Even bringing all the services up to strength with adequate equipment would strain some joints of our national economy.

Should we pull out of Korea by the end of July, the impact will be felt. Military procurement will undoubtedly be stepped up as a precaution against future Communist prodding for weak spots in Persia, or in the Baltic.

In spite of the new unified and streamlined procurement policy, doing business with the government is not easy for a small company. Many learned this to their sorrow during the last war and participated in the program only when forced to by lack of materials.

As a matter of good business planning, every company should do two things: first, obtain a listing on the Munitions Board "Alphabetical Register" production planning purposes; second, get on the "Approved List of Bidders" for current procurement by the various defense departments. Details can be obtained from the local procurement offices of the Army, Navy, Air Force, Maritime Commission and National Advisory Committee for Aeronautics or from Munitions Board Manual No. 90-1 for sale by the Superintendent of Documents, Government Printing Office, Washington, D. C. Price 45 cents.

News From the PE Clubs From the East and West Coasts

NEW YORK.—At the last meeting of the 1949-1950 season of the Plant Engineers Association, Dwight G. Wallace, of the Wright Aeronautical Corp., was elected president, and Earnest Kochli, of the American Molasses Co., secretary-treasurer. During the 1949-1950 season, Herbert L. Hayden, of E. I. du Pont de Nemours & Co., was president and Mr. Wallace was secretary-treasurer.

The 1949-1950 season programs were: October, visit to Forstmann Woolen Co., Passaic, N. J.; November, Instruments and Your Plant, Minneapolis-Honeywell Corp.; December, Dust Control, American Air Filters Co.; January, Steam Jet Refrigeration, Ingersoll-Rand Co.; February, Chlorine in Industry, Wallace & Tiernan Co.; March, Air and Stream Pollution, E. I. du Pont de Nemours & Co.; April, Visit to American Molasses Co.; June, Visit to Sewaren Station of the Public Service Co. of N. J.

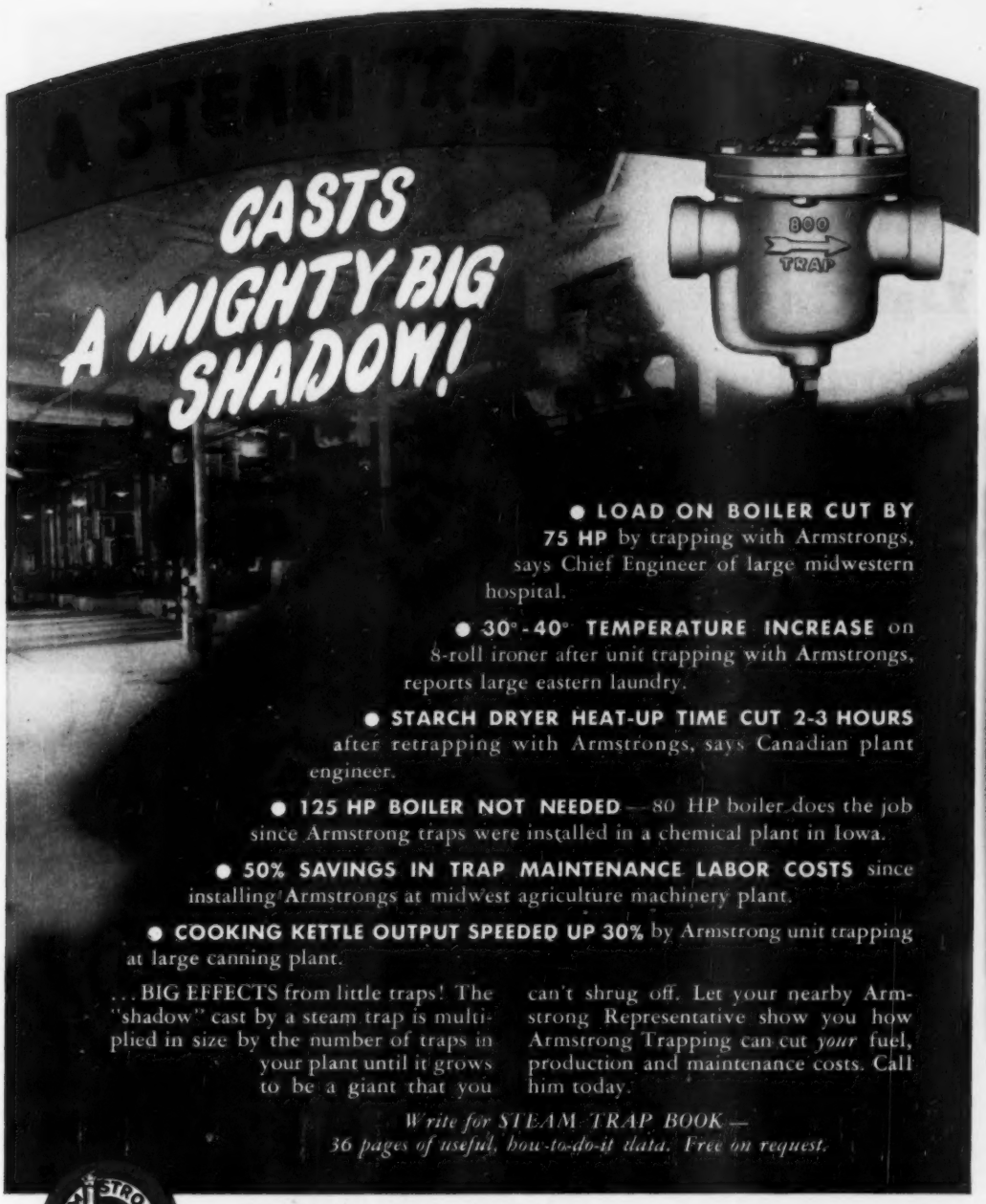
Wallace Kochli Hayden

Lobaugh Sullivan Norman Kinyon

SAN FRANCISCO.—At the second meeting held in Oakland an official name for the organization was selected, the Plant Engineers Society of San Francisco. Rollin J. Lobaugh, of the Pacific Screw Products Co., was elected chairman and Edward F. Sullivan, of the San Francisco Naval Shipyard, secretary.

The May and June meetings were held in San Francisco. At the first, a film on Carbide Tooling by the Carboloy Co., was shown. At the second, the feature part of the program was presented by The DoAll Co. and dealt with metal cutting saws.

At this meeting, W. G. Norman, of Victor Equipment Co., was appointed as chairman of the membership committee for San Francisco and W. B. Kinyon, of the California Ink Co., Inc., and R. H. Morey, of the Pacific Paint & Varnish Co., in the same capacity for the East Bay District. The next meeting of the society will be held September 14th.



● **LOAD ON BOILER CUT BY 75 HP** by trapping with Armstrongs, says Chief Engineer of large midwestern hospital.

● **30°-40° TEMPERATURE INCREASE** on 8-roll ironer after unit trapping with Armstrongs, reports large eastern laundry.

● **STARCH DRYER HEAT-UP TIME CUT 2-3 HOURS** after retrapping with Armstrongs, says Canadian plant engineer.

● **125 HP BOILER NOT NEEDED** — 80 HP boiler does the job since Armstrong traps were installed in a chemical plant in Iowa.

● **50% SAVINGS IN TRAP MAINTENANCE LABOR COSTS** since installing Armstrongs at midwest agriculture machinery plant.

● **COOKING KETTLE OUTPUT SPEEDED UP 30%** by Armstrong unit trapping at large canning plant.

... BIG EFFECTS from little traps! The "shadow" cast by a steam trap is multiplied in size by the number of traps in your plant until it grows to be a giant that you can't shrug off. Let your nearby Armstrong Representative show you how Armstrong Trapping can cut *your* fuel, production and maintenance costs. Call him today.

Write for STEAM TRAP BOOK—
36 pages of useful, how-to-do-it data. Free on request.

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ARMSTRONG STEAM TRAPS

Good Outdoor Lighting would speed this work

Inadequate outdoor lighting can slow down production—siphon off skillfully planned production savings. With good outdoor lighting, material handling efficiency is stepped up, customer-losing errors shrink, overhead-boosting accidents decline and losses from pilferage dwindle.

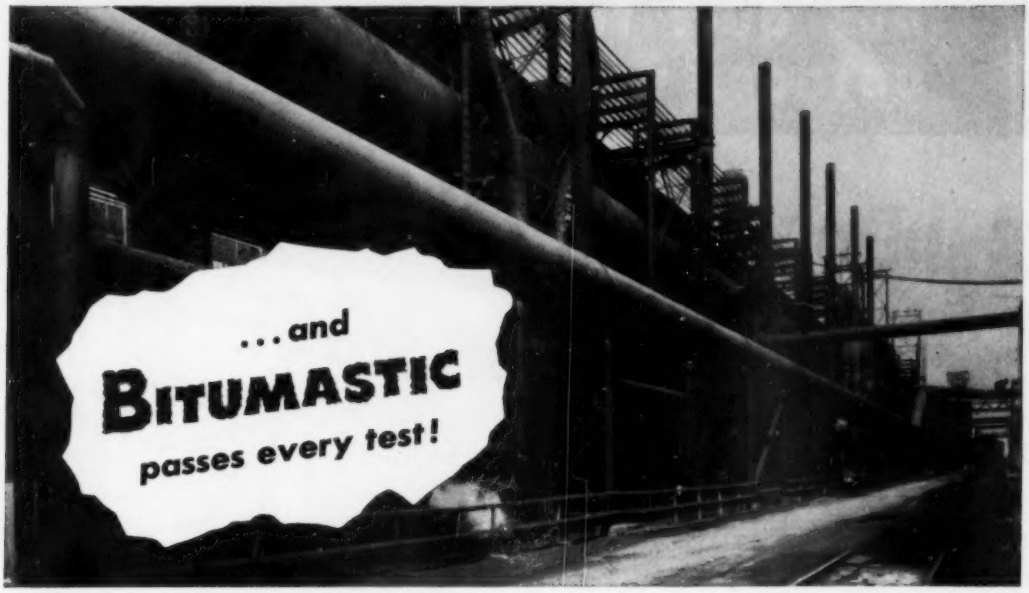
And best of all, most inadquate outdoor lighting systems can be converted to modern, cost-saving systems with minor alterations. For example a modern lighting fixture will put three to four times as much light—down on the job area—as older type fixtures.

Today there are many types of fixtures for outdoor lighting. Some floodlight over a wide area, others rifle it in a narrow beam; some use small 100-watt lamps, others use all the way up to the heavy duty 1500-watt lamps. They all have their place in a well-planned outdoor lighting system.

Good outdoor lighting is not difficult to plan, nor is it expensive. Equipment is simple, easily installed, modest in cost. Your electrical department or contractor can easily do the job. The trained lighting Specialist of your G-E Apparatus Department is available if necessary to make a survey of your plant and help you with your planning. There's also a bulletin "Outdoor Lighting for Industrial Plants." Write to Section 451-150 for a copy. Apparatus Dept., General Electric Co., Schenectady 5, N. Y.

GENERAL ELECTRIC

Here's a TOUGH proving ground for protective coatings



● Gas mains, cold blast mains, exhaust stacks—in fact, all metal areas around blast furnaces are exposed to corrosive industrial atmospheres. That's why this plant, like so many others where corrosive conditions are unusually severe, relies on Koppers Bitumastic® Protective Coatings to prevent corrosion.

Koppers Bitumastic Protective Coatings provide many years of protection against corrosion where ordinary paints usually fail in months. Koppers Coatings save money in other ways, too. One application of Bitumastic No. 50, for example, equals 5 to 8 coats of ordinary paint.

With 50 to 90 per cent of maintenance and replacement costs directly chargeable to corrosion, it pays to find out the full story of Koppers Protective Coatings. It's detailed in our free illustrated book, "Stop Corrosion." Send for your copy, using the handy coupon.

CORROSION PREVENTION IS OUR BUSINESS

Koppers handles the entire job of protecting industrial plants against corrosion. Here are the steps we take to keep industry's No. 1 enemy under control.

SURVEY—Experienced corrosion engineers will survey your plant and determine where protection is needed . . . how much protection is needed.

MATERIALS—Koppers offers a complete family of Bitumastic Protective Coatings . . . materials for nearly every type of corrosion problem.

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FIRST Underwriters'-approved bus duct for outdoor use!

BullDog Weatherproof Lo-X BUStribution DUCT

Now . . . a bus duct system weatherproofed against *rain, snow, condensation* and *heat*. BullDog Weatherproof Lo-X BUStribution DUCT is the first bus duct approved by Underwriters' Laboratories for outdoor use and in wet or damp locations.

Here are just four of its outstanding features that guarantee the finest performance inside and outside your plant.

1 **Moisture-proof.** Bus bars are specially wrapped with moisture-proof tape over standard wrapping of varnished cambric. This remarkable tape seals against entrance of moisture, provides a much higher dielectric.

2 **Corrosion-resistant.** Heavy zinc plating, chromate process coating, and alkid resin base paint protect casing and all steel parts from corrosion.

3 **Increased capacity.** Ventilated steel casing not only prevents moisture condensation, but also rapidly dissipates conductor heat for increased current-carrying capacity.

4 **Low voltage drop.** Closely spaced "paired-phase" bus bars hold voltage drop to a minimum by reducing reactance in system.

First bus duct approved by Underwriters for *outdoor* use, BullDog Weatherproof Ventilated Lo-X BUStribution DUCT answers every need of a modern electrical distribution system. Ask your BullDog Field Engineer to show you a typical installation in or near your own plant.

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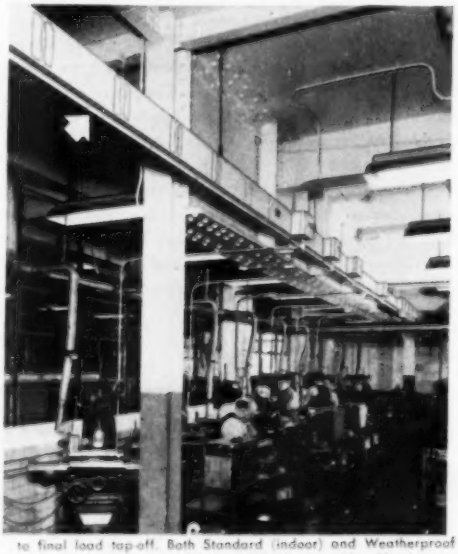
BULLDOG

PIONEERS IN "ON-THE-SPOT" POWER SYSTEMS

Now, an approved bus duct system from outdoor transformer taps...



to final load tap-off. Both Standard (indoor) and Weatherproof Lo-X are available from 600 A. to 4000 A. capacities. Plug-In type BUStribution Duct from 225 A. to 1000 A.

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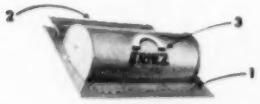
NEW MAGNETIC SEPARATORS FEATURE HYFLUX ALNICO V by INDIANA STEEL PRODUCTS

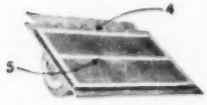
Five New Features!

1 *Riveted construction adds rigidity . . . increases structural strength.*

2 *Continuous hinge means easy and lasting installation.*



3 *Cover adds to longitudinal stiffness . . . prevents tampering and accumulation of iron on backs of castings with consequent shorting of magnetic circuit.*



4 *Insulation confines magnetic strength to working surface . . . no bleeding to surrounding areas.*

5 *Flush air gap prevents gathering of fine iron which can short out magnetic field.*

Eriez ATOMagnets, bristling with super magnetic strength, are here to blast your tramp iron troubles. Nothing can compare . . . strength for strength . . . size for size . . . dollar for dollar . . . with revolutionary Hyflux Alnico V ATOMagnets.

Look at the ATOMagnet. Sleek, rugged, stronger, lighter in weight, sporting five new features you cannot get with ordinary permanent magnetic separators. And it COSTS NO MORE!

Three great models to choose from: "Extrapower," "Ultrapower," "Superpower." Each in a full range of sizes. Each featuring Indiana Hyflux, the Alnico V with 22% more energy.

For chutes, hoppers, spouts . . . over inspection tables, moving belt lines . . . in operating or original equipment.

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PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Make Spray Booth Fire-Proof

FLAMMABLE spray finishes, vapors and deposits can all furnish fuel for intense fires. There have been 432 spray-room fires in Factory Mutual plants in eleven years. The most serious destroyed the entire top story of a large factory building, and was due to a combination of faults—such as handling thinners in open containers, careless smoking, and blocking open the spray-room fire doors.

Spontaneous ignition of spray deposits caused nearly half of the fires. Lacquers, varnishes, and paints containing vegetable oils are the materials most frequently involved. These fires can be prevented by frequent and thorough cleaning of spray booths and ducts, with the cleaning schedule geared to the rate at which deposits accumulate. Water-wash booths are preferable to dry-type booths because they trap excess spray before it can enter the exhaust ducts.

Defective electrical equipment is the second most serious fire cause. Others are cutting and welding sparks, friction from fan blades and bearings, smoking, and open flames from gas or oil-fired equipment, in that order.

Complete automatic sprinkler protection in spray rooms, spray booths, and large exhaust ducts is a primary requirement for good fire protection. The sprinklers must be located to cover all parts of booths and ducts, and provision can and must be made to prevent deposits clogging the heads.

For extensive spraying operations, a detached building or a well-cut-off room in a main building is needed. Keep the amount of paints and thinners in spray rooms at a minimum and make sure that all wiping rags and spray-booth scrapings are promptly and safely disposed. *From Factory Mutual Record, July 1950, a publication of Factory Mutual Engineering Div., Boston 10, Mass.*

Trap Acts as Liquid Seal

A PROBLEM confronting many refrigeration plants is that of maintaining an adequate liquid seal in the refrigerant receiver. If the seal drops below the minimum 6 in. level, high pressure gas blows through the liquid line to the evaporator. The power used to compress this gas is thus wasted. In addition, this high pressure gas adversely affects evaporator operation.

As a solution, the Armstrong inverted bucket steam trap installed between the receiver and expansion valve or valves proved perfectly practical.

During normal operation with adequate liquid in the receiver, the trap as a liquid seal is completely filled with liquid. The bucket is down, holding the discharge valve wide open. When the liquid level in the receiver drops too low, gas enters the liquid line and eventually displaces liquid from the bucket, causing it to float and close the valve. Gas is stopped at this point until the proper liquid level is restored.

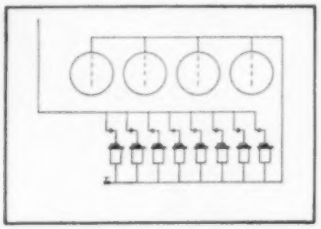


Diagram of 8 traps hooked up in parallel which act as refrigerant liquid seals; and eliminate source of power wastage

One of the latest to report complete satisfaction with this method is Neuva Fabrica de Hielo, in Havana, Cuba. Due to its large refrigeration capacity (1000 tons), this concern uses 8 Armstrong traps as liquid seals in the hookup as shown in the diagram. This means that the 8 traps must pass 500 lb of liquid ammonia per minute. These seals have sufficient power to open at the full differential pressure between the high side and low side of the system.

The seals are wide open 99 per cent of the time with the buckets resting on the bottom of the trap body. The liquid seal simply does nothing, except, in effect, stand by to head off trouble. The other 1 per cent, according to Neuva Fabrico de Hielo, the traps do just that and are an excellent means of cutting needless costs. *From Armstrong Trap Magazine, a publication of Armstrong Machine Works, Three Rivers, Mich.*

"Joe Dope" Hat Comes in All Sizes

Quite the opposite from the regular safety helmet, the person wearing the hat in this picture has violated a safety rule. This unique method of wearing a "Joe Dope" hat is showing amazing results for the department's safety record. (From Spark and Flame, a publication of Central Arizona Light and Power Co.)

Metal Photographs

PHOTOGRAPHIC templates are one of the most recent developments in photography, supplanting older and time-consuming methods which sometimes required 400 man-hours of work to draw or inscribe a template for a single part. This method has been employed at Fairchild Aircraft since the fall of 1942.

Here's how it's done: A drawing is made on a dimensionally stable metal sheet, painted flat white to take pencil lines clearly. When the original engineering drawing is brought to the photo laboratory, it is immediately placed on the copy board of the camera and photographed on a high contrast litho plate.

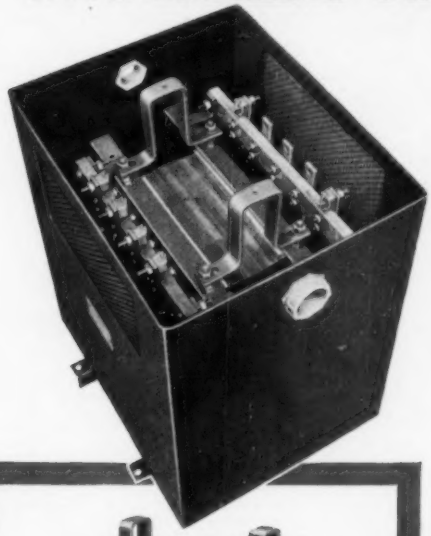
After the glass negative is developed, it is replaced in the camera and the image is projected by a 7½ kw mercury arc lamp, through the lens, onto the copy board in the adjoining camera room. The image is brought to approximate full scale by the adjustment of negative holder, lens and copy board.

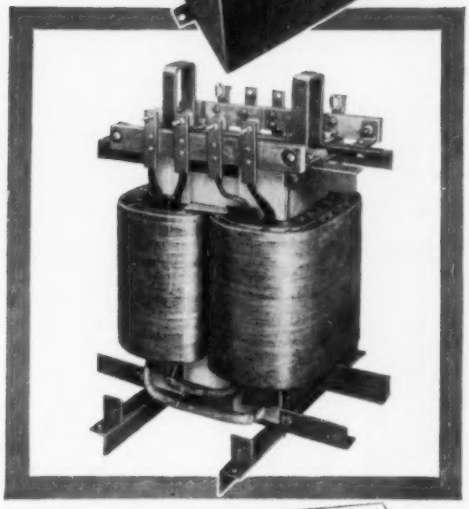
WAGNER TRANSFORMERS *...The choice of leaders in industry*

SAFE POWER

Low Cost, too-

WITH Wagner DRY-TYPE TRANSFORMERS

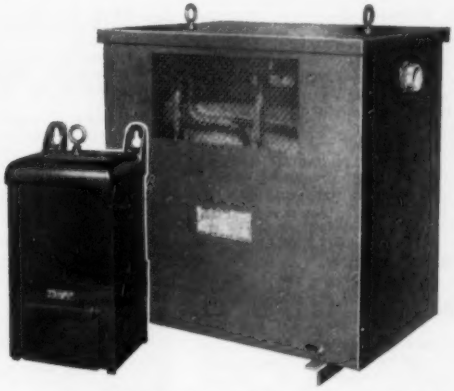




The safest, most economical and efficient way to reduce power distribution costs and to put the right voltage in the right place is to install Wagner dry-type transformers. They provide steady voltage with minimum line losses. They do not require the construction of fire-proof vaults — even in locations where fire hazards are present. They are compact and light in weight — easy to install and easy to move when changes are necessary.

The typical AE, 15 to 100 kva transformer, pictured with core and coils at left, is cased in sheet steel with an easily removable cover. It is equipped with high and low voltage terminals to which incoming leads are connected, utilizing solderless connectors provided for that purpose. High and low voltage external connections are eliminated since ample space and suitable provisions are made for connecting leads inside the transformer.

Twenty-nine branches, located in principal cities, are at your service for consultation on your transformer problems and offer speedy, nationwide service facilities. For full information on Wagner Power and Distribution Transformers, write for Bulletins TU-180 and TU-181.



General purpose dry-type transformers are available in ratings from ¼ to 200 kva, 600 volts and below, single-phase, two coil, Type AE; and from 3 to 300 kva, 600 volts and below, three-phase, two coil, Type AP. Type AA auto-transformers are also available.

WAGNER ELECTRIC CORPORATION
6492 Plymouth Ave., St. Louis 14, Mo., U.S.A.

Wagner Electric Corporation
EST. 1891

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 29 PRINCIPAL CITIES

TB-94

Photographer develops sensitized metal (template) sheet. One man can comfortably manipulate the largest template through the developing tanks

Then, with the aid of special measuring gauges, the fine adjustments are made, thereby bringing the image to the exact scale of the original drawing.

After photographing this metal drawing once, the photo lab can make photographic duplicates for the use of various departments.

The light sensitive coating, or template emulsion, is made in the laboratory, and in manufacture is ripened and digested for the optimum time required to bring out clean whites and blacks. Blank metal of any desired size or material can be quickly coated with the emulsion and after a brief drying period is ready for use. The sensitized metal sheets are then placed on the copy board and are held firmly and flatly thereto by vacuum. After the proper exposure has been given, the metal sheet is carried to the adjacent developing room for processing in large horizontal stainless steel tanks.

Templates vary in size from 18 by 24 in. to 5 by 10 ft, and may weigh over 100 lb. The use of metal for templates is necessary to insure absolute accuracy of reproduction, which may be held to an exactness of ten thousandths of an inch.

Other purposes for which this specialized photographic equipment can be used include the production of accurate reduced scale templates—needed for the construction of small wind tunnel models, the photographing and reproducing of printed material, charts, graphs and illustrative drawings, as well as large size photo murals. *From an article by Charles G. Kountz, in FAD, a publication of Fairchild Aircraft Div., Hagerstown, Md.*

New Fuel Lab

A MODERN fuel system test laboratory with an intricate fire protection system was completed recently at Chance Vought Aircraft Div., Dallas, Texas.

The new laboratory, encompassing 1900 sq ft of floor space, has a 1000 gal underground gasoline storage area, and is equipped with explosion-proof lights and wiring throughout. It is large enough to mock up the complete fuel system of a Chance Vought airplane. The electrical system provides various voltages to simulate actual conditions, and a vacuum pump makes it possible for structure test engineers to see how the fuel system will behave when the airplane is at altitudes up to 40,000 ft.

Fire hazards in the fuel system test laboratory have been reduced to a minimum by the installation of a 4-ton carbon dioxide tank connected with a thermostatically controlled release system. If a fire should raise the temperature within the laboratory to a certain point, the building would automatically be flooded with carbon dioxide.

When carbon dioxide was released into the laboratory on a recent test, the temperature of the building went to 28 deg below zero within a three-minute period. For the protection of workers in the laboratory, an automatic warning horn is sounded fifteen seconds before the gas fills the lab. *From Chance Vought News, a publication of Chance Vought Aircraft Div. of United Aircraft Corp., Dallas, Texas.*

Make Metal Stampings Cheaper

ULTRA-HARD cemented tungsten carbide offers industry an excellent means not only of reducing the cost of all kinds of formed, punched or drawn metal stampings but also to improve the quality of such products.

Dies made of this material cost only 2 to 4 times as much as steel dies but last 10 to 50 times as long and produce better products while they are being used. In addition to the reduced die cost, freedom from service trouble means higher production from stamping presses with less down time for maintenance.

Users of such dies should watch their press equipment. Since the carbide die continues to turn out high quality stampings long after the press would have had to be shut down with a steel die, there is a tendency to forget that press mechanisms require attention. *From a news release of American Society of Tool Engineers, crediting talk of George Eglinton, Vice-Pres., Lincoln Park Industries, Inc., Lincoln Park, Mich.*

Tile With Stainless Steel

ADDED TO the ever-expanding list of applications for stainless chromium-nickel steel is its use as tile for wall surfaces.

In industrial, commercial and institutional architecture these stainless tiles have found numerous uses—in

Light gauge wall tiles of stainless steel are easy to install and attractive in appearance. Will not warp, chip or rust

kitchens, lavatories, showers, in food and beverage bars, and chemical laboratories.

Aside from the permanent corrosion-resistance of the material, these tiles will never crack, warp or chip, and can be easily applied to existing construction. Ordinary plaster, sheet rock or plywood serve as excellent bases for easy and quick installation, which is vermin-proof, resistant to water, heat and wear. *From Nickel Topics, May 1950, a publication of The International Nickel Co., Inc., New York 5, N. Y.*

Rivet with Friction Detonator

THE FIRING of blind rivets by an explosive charge within the rivets is usually an expensive and dangerous operation.

However, the revolver-like development of North American Aviation is said to detonate explosive blind rivets easily, save time, and is operator safe. To detonate the rivet, a high-speed air electrically operated rotary drill motor is adapted to hold the rivet in place. At the same time it gives the rivet a high frictional force to cause it to detonate.

The arrangement consists of a rotary

Operator holds sliding cover which has been removed from adapter, showing Formica tip (A) for generating heat

friction spindle which is held by the chuck of the gun. A sleeve which encloses the friction spindle is slideably contained in the collar of an adapter. This in turn is slipped over the barrel of the drill motor and secured. The tip of the friction spindle is made of Formica that is especially adapted to generate heat and yet act as a thermal insulator. This accounts for the uniformly generated heat confined at the surface between the tip and the rivet head.

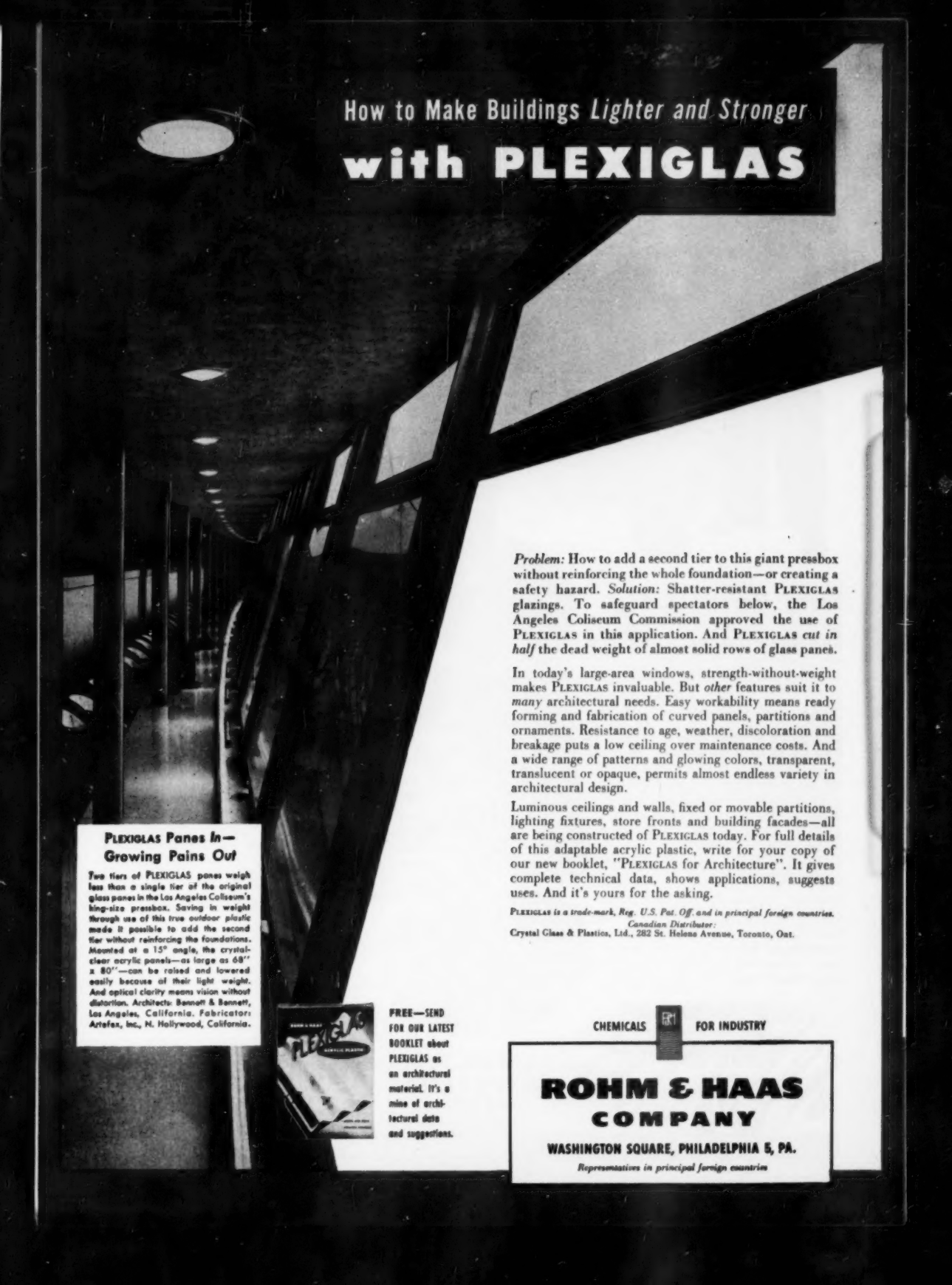
The advantages of this high-speed friction detonator are many. It is instantly ready for use. There is no warm up or cooling off period. No protective equipment is needed to safeguard worker or property. Fabricating time is reduced. The detonator is less expensive to operate. *From This Formica World, a publication of The Formica Co., Cincinnati 32, Ohio.*

"Metamics" Opens New Field

A NEW GROUP of man-made materials called "Metamics" (from metallic ceramics), developed only since the end of the war, are neither ceramics nor metals but are a combination of the two.

They are produced similarly to powder metals and have two outstanding characteristics: they will stay solid at temperatures where metals are molten and they will not crack or break like ceramics when heated suddenly to high temperatures or rapidly cooled.

A typical material in this group, made from chromium metal and alumina ceramic, is being tried for a number of parts in ram jet airplane



How to Make Buildings *Lighter and Stronger*

with PLEXIGLAS

Problem: How to add a second tier to this giant pressbox without reinforcing the whole foundation—or creating a safety hazard. *Solution:* Shatter-resistant PLEXIGLAS glazings. To safeguard spectators below, the Los Angeles Coliseum Commission approved the use of PLEXIGLAS in this application. And PLEXIGLAS *cut in half* the dead weight of almost solid rows of glass panes.

In today's large-area windows, strength-without-weight makes PLEXIGLAS invaluable. But *other* features suit it to *many* architectural needs. Easy workability means ready forming and fabrication of curved panels, partitions and ornaments. Resistance to age, weather, discoloration and breakage puts a low ceiling over maintenance costs. And a wide range of patterns and glowing colors, transparent, translucent or opaque, permits almost endless variety in architectural design.

Luminous ceilings and walls, fixed or movable partitions, lighting fixtures, store fronts and building facades—all are being constructed of PLEXIGLAS today. For full details of this adaptable acrylic plastic, write for your copy of our new booklet, "PLEXIGLAS for Architecture". It gives complete technical data, shows applications, suggests uses. And it's yours for the asking.

PLEXIGLAS *is a trade-mark, Reg. U.S. Pat. Off. and in principal foreign countries.*

Canadian Distributor:
Crystal Glass & Plastics, Ltd., 282 St. Helens Avenue, Toronto, Ont.

PLEXIGLAS Panes *In*— Growing Pains *Out*

Two tiers of PLEXIGLAS panes weigh less than a single tier of the original glass panes in the Los Angeles Coliseum's king-size pressbox. Saving in weight through use of this true *outdoor plastic* made it possible to add the second tier *without* reinforcing the foundations. Mounted at a 15° angle, the crystal-clear acrylic panels—as large as 68" x 80"—can be raised and lowered easily because of their light weight. And optical clarity means vision without distortion. Architects: Bennett & Bennett, Los Angeles, California. Fabricators: Artefex, Inc., N. Hollywood, California.

FREE—SEND FOR OUR LATEST BOOKLET about PLEXIGLAS as an architectural material. It's a mine of architectural data and suggestions.

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Conserve Labor...with a

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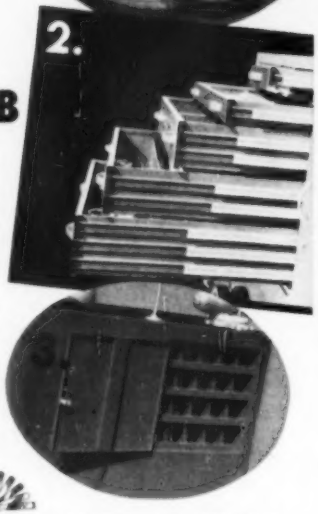
No more running back and forth from job to tool crib when you have this Snap-on Industrial Cab! It carries all the necessary tools right to the job! Saves time! Saves labor! It's big . . . 45" long . . . 24" wide and stands 36" from floor! Three important features are (1.) Automatic foot brake that holds cab in rigid position. (2.) Seven drawers with "No-spill" slide runs plus two extra large tool storage bins. (3.) Twenty compartments in rear for supplies of nuts, bolts, washers, etc. It's a real time and money saver. Write for complete details.



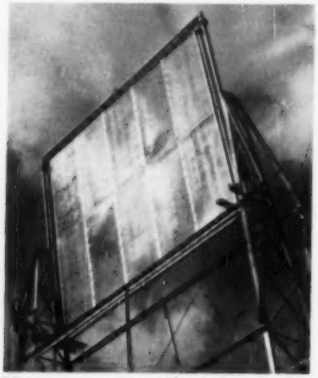
SNAP-ON TOOLS CORPORATION
8068-H 28th Avenue
Kenosha, Wisconsin

engines, for turbo supercharger blades, gas turbine nozzles, etc. In some of these applications temperatures as high as 3000 F are encountered. *From a news release of American Society of Tool Engineers, crediting talk of W. O. Sweeny, Jr., Haynes-Stellite Div., Union Carbide and Carbon Corp., Kokomo, Indiana.*

Microwaves Travel Mirror-Style

MICROWAVES used for communication between a generating plant of the Pennsylvania Electric Co. at Seward, Pa., and an important substation 12 miles away are redirected around a hill by the use of a 20-foot-square aluminum sheet.

Microwaves travel in straight lines much like television signals. Since there was no direct line of sight between the two stations, a mountain top was located visible from both locations where an aluminum reflector could be mounted that would redirect the microwaves much as a mirror reflects light.



Microwaves are redirected around a hill by the use of this aluminum sheet

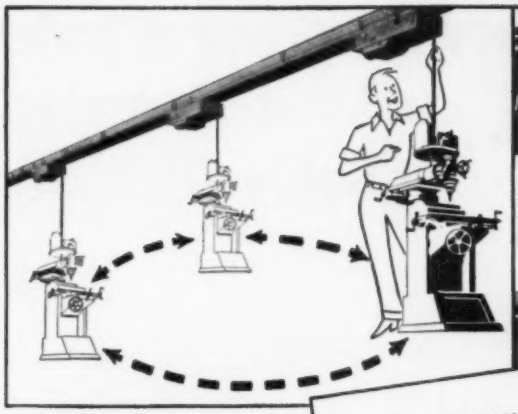
Perforations in the sheet reduce its wind resistance without impairing its efficiency. Because microwaves have a wave length of about one foot, and the openings are only one-inch wide, the waves do not pass through. The system operates in both directions and is capable of sending seven voice conversations simultaneously. *From a news release of Westinghouse Electric Corp., Pittsburgh 30, Pa.*

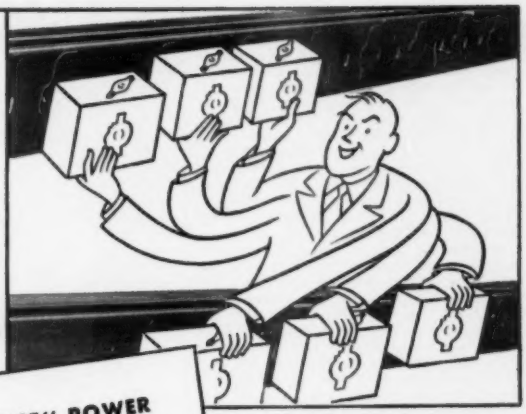
Pump Supplies 278 Burners

DELIVERING OIL at one tank for 278 separate oil burners sounds almost like a fairy tale. It's an honest-to-goodness, down-to-earth fact, however, at a New Haven, Conn., housing project. Instead of 278 separate tanks for each oil burner used in this project, there are two side-by-side 10,000 gal tanks.

Oil is supplied from these two tanks to 276 small pressure burners firing a separate furnace-duct system at 0.85 gph each, and 2 large pressure burners each firing a separate boiler-radiator system at 5.5 gph.

The problem of oil temperature minimums and maximums, resultant viscosities, velocities, piping pressure drops, foaming and air-ridding and many re-





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Always Flexible

Like a continuous panelboard

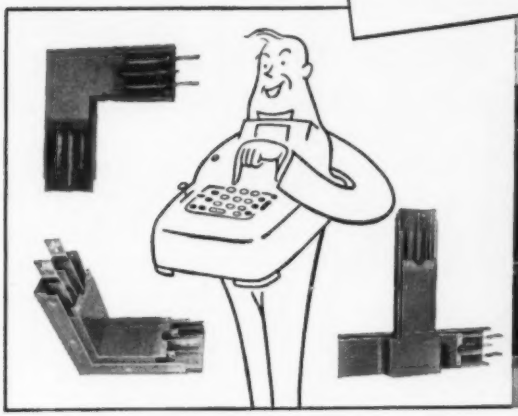
How much time, trouble and money *could* you save if your electric power came off a panelboard running the *entire length* of your plant?

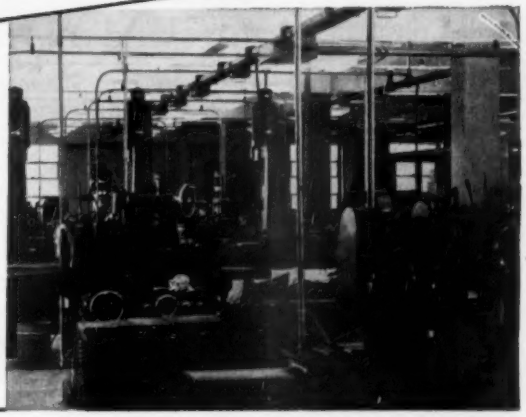
That, in effect, is FVK FLEX-A-POWER® — pre-fabricated busway for 225-1000 amps, 600 volt secondary feeder systems. It's as convenient as curb service — wherever you put a machine, *there's* an outlet.

Relocate loads without rewiring

Every 10-ft section of FVK busway has 15 outlets. You can plug in right at the load . . . rearrange or add loads without rewiring or bothering with extension wires.

Even in cases of major alterations, you can quickly dismantle FLEX-A-POWER, move and reinstall it with practically 100% reuse of materials.





Cheaper to install, too

Standardized parts — straight lengths, elbows, offsets, etc. — delivered to job ready for installation . . . quickly, easily coupled and suspended to conform to any plant layout . . . keep installation time and costs *low!*

Maintenance cost is cut to the bone. Housings resist entrance of dirt and moisture. Materials are made to last.

Remington Rand's Laboratory of Advanced Research at South Norwalk, Conn., saves much time and money by keeping its electrical system flexible. Machinery is quickly relocated without lengthy shutdown. Write for new booklet TEB-4,

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TRUMBULL'S TRAINLOAD OF NEW PRODUCTS

lasting factors required considerable work and study. Added to these problems was also the fact that the project is on the side of a hill. Burners were located at an elevation range of 35 ft.

To develop the right answer to this problem, dwellings at the same level were grouped together. The secret of the distribution system lies in the use of overflow traps to provide proper level of oil for each group of buildings. The system provides the oil head or pressure in each utility room, where the burner is located, and will bring the oil to approximately the floor level of the room. Thus a break in a feed line at the burner unit will not cause oil to spurt out onto the floor nor will the burner be under pressure or required to develop considerable vacuum to obtain oil from the distribution system.

The delivery of fuel oil to the various levels is assured by using two Viking pumps, one being used as standby; either pump being able to carry the full load. Because of the extreme importance of these pumping units to maintain uninterrupted service, it was considered imperative that a standby be ready at all times. *From Viking Vacuum, a publication of Viking Pump Co., Cedar Falls, Iowa.*

New Joint System For Concrete Roads

COMPENSATION for the expansion and contraction of materials is a requisite of practically every construction project. It is extremely vital in concrete road construction. Highway engineers have been searching for years for the perfect expansion and contraction joint system. And while the perfect device never may be found, recent developments indicate that progress in concrete

Workmen install the new joint system. The devices are lightweight, easily handled. Lugs are completely embedded

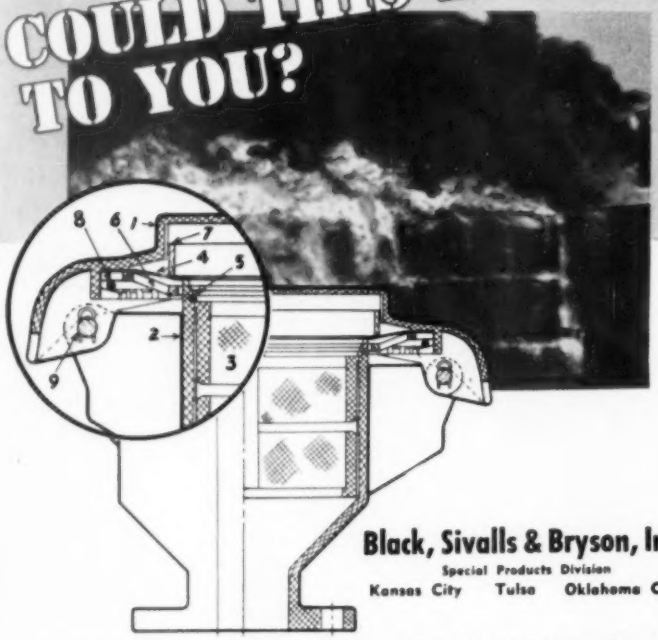
road joint systems is definitely being made.

The expansion joint consists of ¾ in. asphalt impregnated fiber board by which the slabs are divided. To this board the steel plate load transfer devices have been attached and all held securely in proper relative position, as a single unit joint assembly, by the heavy wire basket. On the top of the divider board the new type seal has been installed. The steel plates, shown on either side of the asphalt-impregnated fiber board, have ears or lugs to

(Continued on page 22)

Problem: How to protect tanks at atmospheric pressure from fires

COULD THIS HAPPEN TO YOU?



Black, Sivalls & Bryson, Inc.

Special Products Division

Kansas City Tulsa Oklahoma City

SPECIFICATIONS: 1. Cover—cast aluminum. 2. Body—cast iron. 3. Flame Arrestor Bank—rolled aluminum. 4. Plug—synthetic rubber. 5. Arrestor Spring—steel. 6. Retaining ring—aluminum. 7. Vacuum ring—steel. 8. Retaining Ring Spring—steel. 9. Hinge Pin—stainless steel. NOTE: Bolt circle corresponds to 150 ASA unless special drilling specified.

Pressure-Vacuum Vent Valve Flame Arrestor 2, 3, 4, and 6 inch sizes; internal opening pressure (ounces) minimum 0.5, maximum 1.75, and vacuum opening (ounces), 0.5. **Pressure-Vacuum VVH Vent Valve** (Does not include Arrestor bank) Used as secondary relief valve or, as primary relief valve where Arrestor bank is not required.

Valve Inch Size	Opening Pressure Ounces		Vacuum Opening Ounces
	Minimum	Maximum	
2	3.2	16	0.5
3	3.2	16	0.5
4	2.5	16	0.5
6	2.5	16	0.5
8	2.0	16	0.5
10	2.0	16	0.5
12	2.0	10	0.5
16	2.0	8	0.5
20	2.0	6	0.5
24	1.5	4	0.5

NOTE: Pressures in this table are for cast aluminum cover, and they will differ from other metals. Pressure ratings require a manufacturing tolerance of plus or minus 5 per cent. Vacuum opening can be increased.

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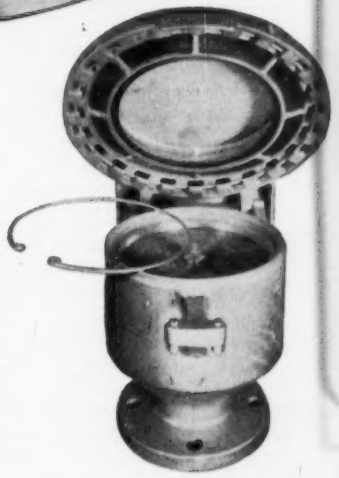
In addition to effective fire control advantages, the BS&B FLAME ARRESTORS may enable you to receive reduced insurance rates. They are listed by the Fire Underwriters' Laboratories.

Flames cannot penetrate the honey-combed construction of the all aluminum BS&B FLAME ARRESTOR bank. It is a neat, compact unit which becomes an integral part of the BS&B VVFA Vent Valves. The Arrestor bank prevents propagation of flame into the tank. The Valve is designed to function under internal pressure or vacuum.

Any volatile material held in tank storage without proper protection is a potential bomb. There is NO COST OR OBLIGATION to investigate BS&B FLAME ARRESTORS for your tanks. Do it now!



Here is the complete package. ARRESTOR bank is shown seated in the VVFA VENT VALVE. The suspended steel ring holds bank firmly in place. Easily installed. Years of dependable service.

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When a mishap all but destroyed a vital coil-vat speed reducer, maintenance men of the M & R Dietetic Laboratories were faced with a serious problem.

A new speed reducer cost 135 dollars and would take 8 weeks to be delivered. Repairing the unit would require only a week, but the damage was so extensive that success seemed doubtful. Yet, there was so much to be gained that they decided to take the gamble.

The shattered speed reducer was sent to M & R's welding shop, where . . . using Ni-Rod® electrodes . . . their welding technicians succeeded in assembling the broken pieces.

The cost of the repair, including labor, was only 10 dollars, and the time required was 1 week. *This represented a net saving of 125 dollars and 7 weeks down time. A highly profitable operation, indeed!*

Experiences such as this . . . of time and money saved in welding cast iron with Ni-Rod electrodes . . . are daily occurrences at thousands of welding shops throughout the nation. The reason for Ni-Rod's popularity with these experienced welders is *dependability*. With Ni-Rod electrodes you get quick, sound, machinable welds in all grades of cast iron . . . usually without preheating or postheating. Ni-Rod works well in all positions; can be used with either AC or DC current.

The best way to find out about Ni-Rod's many advantages is to try it. Order a package today and discover for yourself why *4 out of 5 shops* re-order Ni-Rod, once they have tried it.

Your nearest INCO distributor stocks Ni-Rod in 3/32", 1/8", 5/32", and 3/16" diameters.

Coil-vat speed reducer repaired with Ni-Rod at M & R Dietetic Laboratories, Columbus, Ohio.

For welds you've never been able to make before . . . in high-phosphorous irons; heavy sections—

NI-ROD "55"

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BULLETINS just released and of immediate plant interest

METALS

101 Steel Color Code Chart—To assure plant engineers positive identification of steel purchased from this company, a code chart printed in full color is available. It shows color markings used on more than 50 types of stock, including hot rolled and cold finished alloys, stainless, hot rolled and cold finished carbon steels, and plates and structurals. United States Steel Supply Co.

102 Engineering Data on Inconel—In addition to providing extensive information on Inconel, 24-pp Bulletin T-7 also presents details on the composition, mechanical properties and physical constants of Inconel X, one of the newer age-hardened Inco nickel alloys. Material on Inconel includes physical constants, mechanical properties, effect of temperatures on strength, corrosion resistance, working characteristics, and a general description of mill products and typical uses. Text is generously illustrated with photos, tabular material. Development and Research Div., The International Nickel Co., Inc.

103 Modern Metallurgy—Compiled for industrial users of iron and steel castings, this 26-pp illustrated bulletin provides extensive information on the chemical composition, mechanical properties, heat resistance and other characteristics as well as applications of 12 ferrous alloys. Also tells how company, in addition to producing basic materials, has facilities to cast and finish machine parts. Hunt-Spiller Mfg. Corp.

PROTECTIVE COATINGS

104 Coatings to Stop Corrosion—Form 948-a is a 16-pp illustrated catalog presenting company's Bitumastic coatings for protecting a wide range of industrial equipment—from tanks to stacks. Explains how these coatings protect against corrosion due to industrial atmospheres, chemical fumes, moisture, corrosive soil, and heat. Discusses surface preparation for these coatings, tells how to apply them. Six individual coatings are discussed in detail and their special applications pictured. Koppers Co., Inc.

105 Rugged Coating—The characteristics, use and applications of a general purpose emulsified asphalt for protecting a great variety of structures are presented in this bulletin. Illustrates eight actual uses of this protective coating where its resistance to acids, fumes, alkalis, salt spray, brine drip, actinic rays of the sun and the elements was a prime consideration. Also shown are examples of the coating's ability to hold "sprayed-in" colored granules; to adhere to all types of clean surfaces without priming; to be applied without heating, and to withstand heat up to 450 F. Bituseote Products, Div., Bridges Paving Co.

106 Protection for Concrete Floors—Bulletin 111 describes floor enamels developed to protect concrete surfaces from acids and chemicals. Gives methods of application, coverage, colors. Discusses special features of these chemically inert enamels which are claimed to offer outstanding abrasion and wear resistance, and to resist action of mold growth, gases and chemicals. Houghton Laboratories, Inc.

107 Building Construction and Maintenance Manual—Here's a 112-pp illustrated manual handy enough to rate carrying space in a plant engineer's pocket. It's packed with facts on concrete and wood floor treatments, paints and protective coatings, concrete and mortar admixtures, waterproofing and dampproofing, caulking compounds, and roof coatings, covering some 45 products in all. Product descriptions include directions for use. Indexed by product and use, the book includes estimating guides on floor treatments and roof coatings, brick requirements, timber requirements, recommended water-cement ratios. L. Sonneborn Sons, Inc.

MECHANICAL POWER TRANSMISSION

108 Motor Pulley Engineering Data—An illustrated discussion of features that can prolong the service life of motor pulleys and tips on how to select the motor pulley to suit job requirements are included in Catalog 40 covering company's line of variable speed motor pulleys. Provides rating tables for endless belt and double block belt installations, dimensions and shipping weights. Also provides data on combination pulleys. Lewellen Mfg. Co.

109 Traffic Cops for Speed Drives—Book 2349, 8-pp, introduces a new line of automatic speed controls for use with company's PIV variable speed drive, which are designed to automatically control output speed range. Describes and illustrates the four available types—electronic, pneumatic, hydraulic and mechanical. Includes diagrams of job engineered applications covering some of the many industrial uses for these controls. Link-Belt Co.

110 V-Belts for Heavy Loads—Bulletin MV-201 provides a price list and comparison table for the standard and special sizes available in company's multiple V-belts. Discusses the pulling power, flexibility and other advantages of these belts. Explains and illustrates the heavy rope cord construction of belts for smaller pulley drives and the heavy-duty construction to withstand shock loads, furnished in lengths over 120 in. Maurey Mfg. Corp.

111 Ball Bearings for Conveyor Systems—Helpful information on the mounting and use of company's lubricated-for-life ball bearings in mechanical conveying systems is furnished in Form A-32, 16 pp. Photos and sketches of bearings for different types of shafts accompany text explaining development and application of these bearings, and more than 25 photos show installations. Dimensions and capacities are included. New Departure Div., General Motors Corp.

PIPING, TUBING, FITTINGS

112 Copper Tubes—Where and How to Use Them—Publication C-24, a 64-pp catalog, covers the use of copper in the pipelines of many industries, including process applications in chemical plants, distilleries and sugar and textile mills, in refrigeration and air conditioning, in mechanical jobs such as pressure lubricating systems and pump equipment, and in plumbing and heating installations. Actual installations are pictured and described and necessary engineering information provided. Book also discusses the low first cost, light weight, rust resistance and other practical advantages of copper tubing. Full data on accessories and fittings included, also instructions for assembling, sizes, weights. The American Brass Co.

113 Hose Couplings and Fittings—Catalog Section 3100 pictures and gives details on couplings and fittings manufactured by company, together with specifications, general and maximum pressure recommendations and a description of threads. Products cataloged include common couplings; combination nipples, special suction hose couplings, interlocking high pressure couplings; hydraulic hose couplings and hose adapter unions; pipe, inserted, built-on and screwed nipples, flanges, clamps, menders. The B. F. Goodrich Co.

114 Pipe Fittings Catalog—Anyone who specifies cast iron and malleable pipe fittings will appreciate Catalog 59 F. Described as a model of conciseness and easy reference, this 118-pp fabrikoid-bound book provides listings complete on each page so you won't have to refer to other pages for details. Includes a photo and dimensional drawing of each fitting, along with price, weight and dimensions. There's also a condensed price list for those who want cost information only. Packing weights and essential engineering data are included and book is indexed. Stockham Valves & Fittings.

115 Expansion Joints—Sixteen-pp Bulletin E-55-51 explains the design and construction of a corrugated packless expansion joint that requires no maintenance. Includes sizes, temperature and pressure ratings, dimensions and weights. Simplified selection charts make it easy to determine proper joint for most applications. Recommended installation practice is summarized with pertinent engineering information. Illustrated with photos of types, cut-away views and typical installations. American District Steam Co.

116 Steel Tubing—Technical data and fabricating information on steel tubing are given in this 20-pp handbook. Illustrated with photos and colored sketches, it explains merits of this double-walled tubing made from a single strip of metal and discusses some of its uses. Includes specifications, corrosion and fatigue resistance data and tells how tubing may be fabricated, coatings which may be applied.

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Available sizes and lengths are listed, typical fabricated parts illustrated. Bundy Tubing Co.

117 Seamless, Welded Tubes—Six-pp Bulletin TB-329 on heat exchanger and condenser tubes provides specifications and data on various grades and size ranges available. Also includes application information on carbon steel, low and intermediate chromium steels, nickel steels and stainless steel tubes. The Babcock & Wilcox Tube Co.

118 Tube Cleaners and Expanders—Bulletin 46 is a 36-pp ordering guide covering tube cleaners for bent or straight tubes, tube expanders, and such oil refinery specialties as cut-off tools, heat exchanger accessory tools and a catalyst removal system for polymerization units. Includes sizes, application information, photos of all equipment. The Airetool Mfg. Co.

HEATING

119 Steam Circulation Analyzed—Technical Bulletin 4 is a discussion of steam circulation systems and is liberally illustrated with engineering drawings. Treats such subjects as steam and condensate velocity, flow, ways of increasing air/condensate film velocity, steam circulation, internal construction of steam space and applications for steam circulation pipe heaters. Barco Co., Inc.

120 Heating Unit Data File—Here's a 16-pp catalog on electric industrial heating elements and units. Made up in loose leaf, specification sheet form, it lists voltages, wattages, temperature ranges, dimensions, shipping weights and prices, as well as applications and uses for immersion, urn-type finrod, rod-type and other heating units. Data on connections and switches is included. Plant engineers concerned with manufacturing equipment requiring heating units and the processing of food, chemicals, plastics, rubber, oils and paints will find this information especially helpful. Tuttle and Kift, Inc.

121 Converter Data—Catalog 302, provides essential engineering information on company's line of converters designed especially for use with hot water heating systems and covering those for use with radiant heating systems as well as standard hot water systems. Fully documented with selection charts and tables. Patterson-Kelley Co., Inc.

VALVES

122 Air Control Valve Catalog—More than 15 general types of air control valves, as well as accessories, are presented in this recently revised 44-pp Catalog 100, Section 4. In addition to discussing general design and construction features, it includes dimensional and application data on each valve listed, tells how and where it is used. Logansport Machine Co., Inc.

123 Solenoid Valves—Company's expanded line of direct operated solenoid valves for automatic or remote flow control of liquids and steam up to 400 F as well as high viscosity liquids is covered in Bulletin V. Lists sizes from ⅛ to 2 in.; valves for normally open or normally closed service; stainless steel or Jenkins disc seats; valves with special dash-pot construction to stop water hammer; 3-way solenoid valves. All valves are built for pressures to 150 lb. Typical installations are pictured. The Johnson Corp.

124 Check Valves Worth Checking On—A newly-developed basic check unit offering extreme simplicity and utility is introduced in Form C.V.1-50. It shows how this unit, when added to any standard fitting—tee, elbow, cross or coupling—becomes a complete check valve designed to operate in any position, on any liquid, gas or air, at all temperatures and pressures, and to provide positive closure. Explains how seat member is threaded to fit standard pipe fittings, and valve member is built for long service. Durable Mfg. Co.

125 Unions and Valves — Catalog 11, 28 pp, presents company's full line of steel unions—standard, heavy duty, orifice, lug nut and other types—as well as several types of check valves for vertical and horizontal use. Includes data on steels used and on union seats and coupling threads. Equipment listed is accompanied by photos, sizes, thread ranges, pressures handled, also prices. Includes table of dimensions and weights of steel pipe. Catawissa Valve and Fittings Co.

ELECTRICAL

126 Sealed Relays—Featured in Catalog 5-R are lighter weight, hermetically sealed relays especially suited for applications where humidity or dust conditions present a serious hazard to continuous operation. Describes and pictures the lug header, AN connector, octal plug and screw terminal types and includes full operating, contact and mounting data on a wide range of contact combinations and operating voltage ranges. Also includes information on performance of units conforming to requirements of the ANS-20b and 10-C vibration tests. Guardian Electric Mfg. Co.

127 New Booklet on Transformers—Design and construction features of company's power and distribution transformers—both large and small and secondary network—are described in Bulletin 01E0186D, 16 pp. Also covered are three types of load-ratio-control mechanisms available on the power transformers, depending on voltage, kva capacity and other circuit conditions. Step regulators, pole-type regulators, unit substations of all types, and instrument transformers are also presented. Allis-Chalmers Mfg. Co.

128 Electrical Contacts and What Goes Into Them—A 28-pp ordering book on company's complete line of electrical contacts, Form M-105 also provides detailed engineering information on contacts and the materials used to make them. Defines terminology used and gives illustrated tips on how to recognize symptoms of electrical contact failure. Individual discussions of the different metals include application suggestions. Gives ordering data on rivet, screw, button, and special type contacts. Discusses practical contact assembly methods. Fansteel Metallurgical Corp.

129 Circuit Breaker System at Fuse Box Prices—Bulletin C.B. 1000, 28 pp, introduces the Stab-lok, a simple and economical air circuit breaker of unit-pole construction with thermal magnetic overload. Design features and operation of the circuit breaker are described and illustrated and nine types of enclosures cataloged. Methods of mounting are also shown and dimensions and knockout locations diagrammed. Book also illustrates and lists more than 300 fusible and circuit breaker devices now manufactured by company for which the Stab-lok line can be substituted. Federal Electric Products Co.

130 Electrical Connectors—Bulletin MC-106-2 is an ordering catalog covering company's standard line of molded neoprene rubber electrical connectors and related equipment—lamp sockets, distribution centers and vulcanizers. All equipment is illustrated and described as to construction and application and available sizes listed. Mines Equipment Div., Joy Mfg. Co.

131 More Power to Production Lines—Bulletin 170 is a comprehensive, pictorial presentation of 70 selected applications showing what industry is currently doing to modernize machine designs and production lines. Besides offering ideas as to application and design for your own product or equipment, it shows the use of modern electric power drives on new machinery installations, of compact geared electric power drives at correct production speeds, of variable speed drives which can increase value of your equipment, and of old machinery and old plant operations modernized through improved applications of electric power drives. Sterling Electric Motors, Inc.

132 Motor Reversing Switch—Bulletin describes the design, installation and application of the new Reverswitch applicable to any standard make of split phase and capacitor start motors. Mounted in the end bell the switch provides instant reversal, quick stop or normal starting and stopping of single phase motors. Heating Control Div., Iron Fireman Mfg. Co.

MATERIALS HANDLING

133 Tractor for Tough Jobs—A diesel tractor which, through the use of a hydraulic torque converter drive, delivers higher average horsepower and does more work over a given period, is described in 32-pp Form MS-426-504. Illustrated with photos and cutaway drawings, the bulletin discusses the hydraulic torque converter drive in detail, also other construction features and design details of the tractor—its engine, injection system, temperature control, etc. Also describes ease of operation and maintenance, gives full specifications. Allied equipment and accessories are also pictured. Allis-Chalmers Mfg. Co.

134 Handy Plant Truck—Bulletin 28 features company's 1-t capacity Tote-master, a versatile and economical pick-up truck which can be operated at speeds up to 20 mph. Includes full specifications, dimensions. Lewis-Shepard Products Inc.

(Continued on page 77)

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Finished rotors are sprayed with a special rust inhibitor which covers the rotor, the shaft, and cadmium-plated fan used on smaller motor sizes. Larger motors have aluminum fans. These are not sprayed.

STEEL PARTS

The complete assembly of body and shell, with the stator, is dipped in "Robbinite," and this moisture-resisting undercoating—developed by Robbins & Myers—is then baked on, prior to final painting.

END-HEADS

Cast-iron end-heads and the cast-iron terminal box are carefully cleaned and given the same anti-corrosion treatment, inside and out, often specified by our Armed Forces for use in damp climates.

SEALED AGAINST LEAKAGE

Terminal box is gasketed, and lead-ins are sealed at the motor shell. Repellent grease on shaft keeps moisture away from bearings. End-heads give motor full-height protection.

Now...

YOU GET "PACKAGED PROTECTION" IN R&M *ALL-WEATHER* MOTORS

Standard R & M Integral Motors now are completely "Weatherized"—and all at *no extra cost to you.* They're protected—inside and out—from damaging moisture which so often causes premature failure. Weatherizing prevents rust, corrosion, and rapid deterioration of insulation materials. It makes good R & M Motors last even longer, *wherever* they're installed.

PROTECTION, PLUS. New R & M Weatherizing, plus R & M "Clean Sweep" high-velocity *end-to-end* ventilation, keeps these durable motors both internally clean and *remarkably* cool-running. They operate cooler than comparably rated motors on the same work. And you can even mount them outdoors *without a cover.* They're snake-proof and mouse-proof. Nothing has been forgotten.

VALUABLE "EXTRAS." Only Robbins & Myers gives you all these "extras" in a *standard* motor: Weatherizing . . . shrouded end-heads . . . pre-lubricated, sealed ball bearings (adopted in 1939) . . . insulation of *both* phase groups and coil windings . . . and many other construction refinements. Sizes: 1 to 50 h.p. All types. The whole *quality story* is yours for the asking. Write today.

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DRAVO HEATERS

Saved $530,000*

in mammoth new auto plant

*Compared with conventional steam system cost.

Half a million is important money in anybody's language—and it gets more important when it's SAVED instead of spent.

That's just what happened when a leading automobile manufacturer recently built a mammoth new body plant, with over 600,000 sq. ft. of floor space, and with ceiling heights ranging up to 52-feet. Heat requirements, including fresh air tempering provisions, totalled 54,250,000 Btu. Lowest quoted price for a conventional steam boiler plant was $860,000. ACTUAL cost of a complete Dravo *Counterflo* Heater installation of 53 units was $330,000. These direct-fired warm-air heaters take care of all open-space heating requirements of the manufacturing area of the plant.

Bear in mind that these savings involved no compromise with heating effectiveness. The top-flight engineers responsible for selection knew how vital *comfort* is in keeping employes contented and promoting top output. They looked *first* for the finest in heating results . . . and *second* for economies. They found both profitably combined in Dravo Heaters.

Neither did this saving come from "cutting corners" in building the heater, but rather through the basic simplicity of method and equipment. Each of the oil-fired space heaters manufactures heat "on demand" to blanket its own assigned area with warmth. It also introduces fresh, tempered air into the building as needed. Modulating burner controls permit continuous operation and continuous air circulation. This minimizes temperature fluctuation, assures maximum comfort in all weathers, and conserves fuel—for when any section needs LESS heat, its unit burns LESS fuel. Units all have the Underwriters' Laboratories label. They can be converted from oil to gas, should the fuel situation make this desirable.

This spectacular saving has been duplicated on a lesser scale in thousands of smaller plants. If you are concerned with heating any new or old building, you owe it to yourself to find out how Dravo *Counterflo* Heaters are serving and saving for others . . . and how they can save both system costs and operating costs for YOU. Look in the yellow section of your phone book—or write us direct at Dravo Building, Pittsburgh 22, Pa., for Bulletin FH-523-687.

DRAVO CORPORATION

Sales Representatives in Principal Cities

Mfd. and sold in Canada by Marine Industries, Ltd. Sorel, Quebec

Export Associates: Lynch, Wilde & Co., Washington 9, D. C.

(Continued from page 16)

anchor them firmly and securely to the slab face since they, like the wire basket and dowel bar, are embedded in the concrete as it is poured to a level flush with the top seal. The plates are connected by a ¾ in. cold rolled dowel bar ten inches long.

The force of a wheel load passing over the joint is transferred from this dowel bar into the steel plates and dispersed into the concrete slab through the anchoring lugs. This serves to distribute the imposed load over a wide area in and away from the slab face instead of concentrating the load in the confined area immediately under the dowel. The plate reinforcement under the dowel is said to assure permanent slab level at the joint.

The patented contraction joint is identical to the expansion joint but utilizes a ⅛ in. thick pressed-wood board for a divider plate in place of the ¾ in. thick asphalt-impregnated fibed board used with the expansion joint. The operating principle is the same.

There is no established formula or design standard governing the spacing of joints in a concrete highway. Nor is there any definite relationship between the number of contraction joints and the number of expansion joints. However, the concrete slab must be divided at intervals for the relief of internal stresses and when such divisions occur there must be a means of load transfer and the joint opening must be sealed against the entrance of water and solid matter.

It was necessary to find a satisfactory material for the sealing strips, since the seal protects the joint structure and thereby the entire road from its most destructive element—water on the subgrade. Neoprene was decided upon because it was found to be the only available material that could do the required job. It is compounded to withstand severe exposures to sunlight and weathering, aging, and contact with oil, grease and gasoline. *From The Neoprene Notebook, a publication of E. I. DuPont DeNemours & Co., Wilmington, Del.*

New "Croning" Process

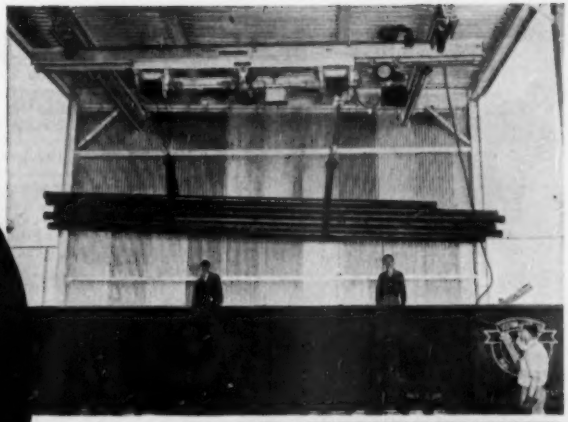
THE NEW PROCESS for casting metals known as the Croning process, claims the following benefits—improved quality in the casting, improved working conditions in the foundry, and reduced cost.

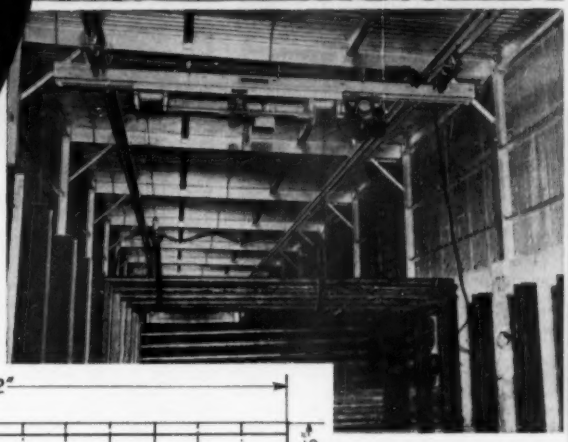
This process employs a special Bakelite resin-binder for producing cores and molds from sand. Although resins have been used for many years in sand core binding, the new method is a radical departure in that it does not require long baking and curing and uses relatively small volumes of sand.

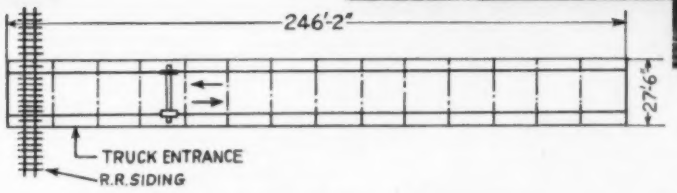
The outstanding advantage of the castings produced with this process is the quality precision that is obtained. The casting comes from the mold with clean, sharp edges, true dimensions, and unchilled surfaces that require little or no finishing, such as sand blasting or wheel-abrating.

It is reported that the quality and precision of the casting are increased to the point where tolerances of 0.002 to 0.003 of an inch per inch can be common practice. Where extremely close tolerances are required, usually

SAVES $30 EVERY CAR UNLOADED







Every time a carload of pipe averaging 60,000 pounds is unloaded in their Roanoke warehouse, The Noland Company, Inc., realizes a saving of thirty dollars.

Two men in the car attach flat slings on the twin-hook electric hoist to a load of pipe. By push-button control, the crane operator raises the load to the upper limit. He then dispatches the 2-ton American MonoTractor Crane to any of 13 stations along the 246 foot craneway where it contacts a retractable limit switch and stops.

A man on the warehouse floor takes over control, places pipe in the proper rack, unhooks one side of each sling, pulls the sling through the pipe by raising the hoist hooks. The crane is then dispatched back to the car.

It is estimated that the American MonoRail system will pay for itself in less than a year. With hundreds of similar installations to draw upon, American MonoRail can save you money. We'll gladly send an engineer.

THE AMERICAN MONORAIL COMPANY

13123 ATHENS AVENUE **CLEVELAND 7, OHIO**

With molds like this, quality precision casting is obtained, with tolerance of from 0.002 to 0.003 of an inch per inch

only a finish cut is necessary rather than a rough cut followed by a finish cut. In some instances where holes are required in the casting, they can be formed in the mold, and subsequent drilling is eliminated.

A saving of up to 90 per cent of sand required is realized because the new mold consists of only a thin shell firmly bonded with resins, as contrasted with the conventional heavy and cumbersome sand molds. The reduction in the amount of sand is accompanied by a proportionate reduction in the amount of sand handling and preparation. It is also claimed that the cleanliness of the new process will tend to promote easier, cleaner, and more healthful conditions for the foundry workers.

The process is a development of Johannes Croning of Hamburg, Germany. Crown Casting Associates, 75 Federal St., Boston, Mass., own and control United States and Canadian patent applications directed to various aspects of this new process and are offering licenses to the foundry industry for use. *From Bakelite Review, a publication of Bakelite Div., Union Carbine and Carbon Corp., New York, 17, N. Y.*

Cocoon-Seal Fumigation

EACH YEAR tobacco destroyed by insects results in a loss of millions of dollars. In an effort to reduce this loss, U. S. Department of Agriculture experts developed the application of Vinylite plastic spray coatings to seal tobacco warehouses before fumigation. This type of coating, also used to protect military and naval equipment from

Mixed with solvents, plastic coating is sprayed rapidly by untrained workers on the exterior of tobacco warehouse

weather, corrosion and rust, makes possible a drastic cut in the cost of sealing crop storage places for insect fumigation and promises a less costly seal for other commodity storage houses.

This plastic coating can be sprayed on a warehouse rapidly and with a minimum of untrained labor. Applied with a pressure spray-gun, the resin-based solution dries in a tough film that is resistant to weather, flame and chemicals. A coating only five thousandths of an inch thick prevents fumigant gas escaping the warehouse, yet is not affected chemically by the fumigant.

The sealer can be sprayed on the outside of the storage place, or on the inside if precautions are taken to draw off fumes of the rapidly evaporating solvents, which are flammable. Many areas, such as unbroken tile walls and closed fire doors, need be sealed only at the edges with plastic coating, whereas conventional paper and mineral

The dry coating obtained in this sealing process is a continuous plastic film. This coating is easily patched

asphalt sealers would require that the entire area be covered.

Holes larger than one-quarter inch receive special sealing treatment. An adhesive binder is first sprayed around the hole, then a special webbing solution is sprayed over the hole until a filmy web has been built up. This is then covered with the plastic coating for a continuous seal. Breaks larger than 18 in. can be sealed in the same manner after being segmented with pieces of tape. Still larger openings are closed with cheesecloth or paper which serves as a base for the plastic coating.

Maintenance of this coating is sometimes complicated by curious visitors and laborers who pinch, punch, and even dig pieces out of the plastic film with pocketknives. However, the Agriculture Department experts believe it requires less care than conventional sealers because elasticity and tensile strength enable the plastic film to wear well under most adverse conditions.

This plastic retains its elasticity and does not dry up or break off like conventional sealers. However, it can easily be stripped away, except where binder has first been applied. The overall cost of applying the plastic seal to a storage warehouse has been found to be considerably less than the cost of applying conventional sealers chiefly because of the saving on labor costs. *From Bakelite Review, a publication of Bakelite Div., Union Carbide and Carbon Corp., New York 17, N. Y.*

Wiring Low-Temperature Rooms

ELECTRICAL WIRING is usually considered a relatively small detail in the construction plans for a freezer room. For this reason, lights and fixtures are all too often an afterthought—a last minute detail.

Faced with such a problem, the electrician can do nothing but wire the room from the outside, dropping outlets through the ceiling at those points where lights are required in the freezer. This practice violates a cardinal principle of insulated room construction; that is, the insulation envelope should be pierced or broken only at a minimum number of places.

Metal conduits leading into a freezer room are good conductors of warm air and heat, and each conduit thus reduces the efficiency of the job. The moisture in the warm air flowing into the room through the break made by the conduit will condense, turning to ice in the surrounding insulation and on the outer surfaces of electrical fixtures. The moisture in the warm air in the conduit itself will do the same thing, forming more ice inside the conduit and fixtures and on light globes. Over a period of time, all this condensation and freezing is bound to have damaging effects on both the insulation and the electrical work.

By a little simple planning before the insulation is erected, the damaging consequences of freezing in and around conduits and fixtures can be avoided. Best recommended practice is to bring the electrical wiring into the freezer through a conduit piercing the wall insulation just underneath the ceiling insulation of the freezer. This conduit should pass through a sleeve of cork pipe covering, previously set in the wall, and be carried along the underside of the freezer room ceiling, with leads taken off and distributed to points where lights are desired.

It is good practice to seal the inside of the conduit at the point where it goes through the wall into the freezer. Special sealing condulets, which can be poured with wax, will prevent the infiltration of warm, moisture-laden air through the conduit into the cold room. If no provisions have been made for special sealing fixtures, the conduit can be effectively sealed by pouring melted wax into a hole drilled into the conduit where it is bent to pass through the freezer wall.

Suspending light fixtures and electrical conduits to the underside of the ceiling often presents a problem. This is readily solved by the use of wooden blocks. At predetermined locations on the ceiling, these wooden blocks are secured to the ceiling construction in the first layer of insulation. Blocks should be at least 6 in. by 6 in., and equal in thickness to the first layer of insulation. As the insulation men cover these blocks with the second layer of corkboard, they can indicate their location with chalk. The electrician can then drive lag screws into these blocks to support light fixtures. For the sake of appearance, conduits can be placed between the first and second layers of the corkboard insulation. Naturally, extra labor is involved in routing out a channel for the conduit between the two layers of corkboard. *From an article by V. J. Amorose in Armstrong's Insulator, May 1950, a publication of Armstrong Cork Co., Lancaster, Pa.*

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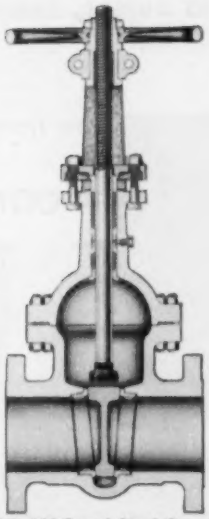

No. 33XR, 300-Pound Steel Gate for steam up to 850° F.; for water, oil, air or gas up to 500° F.; Exelloy to Nickel Alloy seating. Sizes: 1½ to 24 in.

STEEL VALVES FOR SEVERE STEAM SERVICES

Crane Cast Steel Wedge Gate Valves find wide application wherever exceptionally rugged and durable steel valves are required. Body and bonnet have heavy metal sections and ample reinforcements at points under greatest stress. Straight-through ports assure minimum turbulence, erosion, and resistance to flow.

Solid wedge disc with close fitting disc guides maintains accurate seating on shoulder-type screwed-in body seat rings. "T-head" disc-stem connection prevents side strain on stem. Available in pressure classes from 150 to 1500 pounds with a variety of trim materials especially suited for recommended services. Screwed, flanged, or welding ends. See your new No. 49 Crane Catalog, p. 227.

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Branches and Wholesalers Serving ALL Industrial Areas

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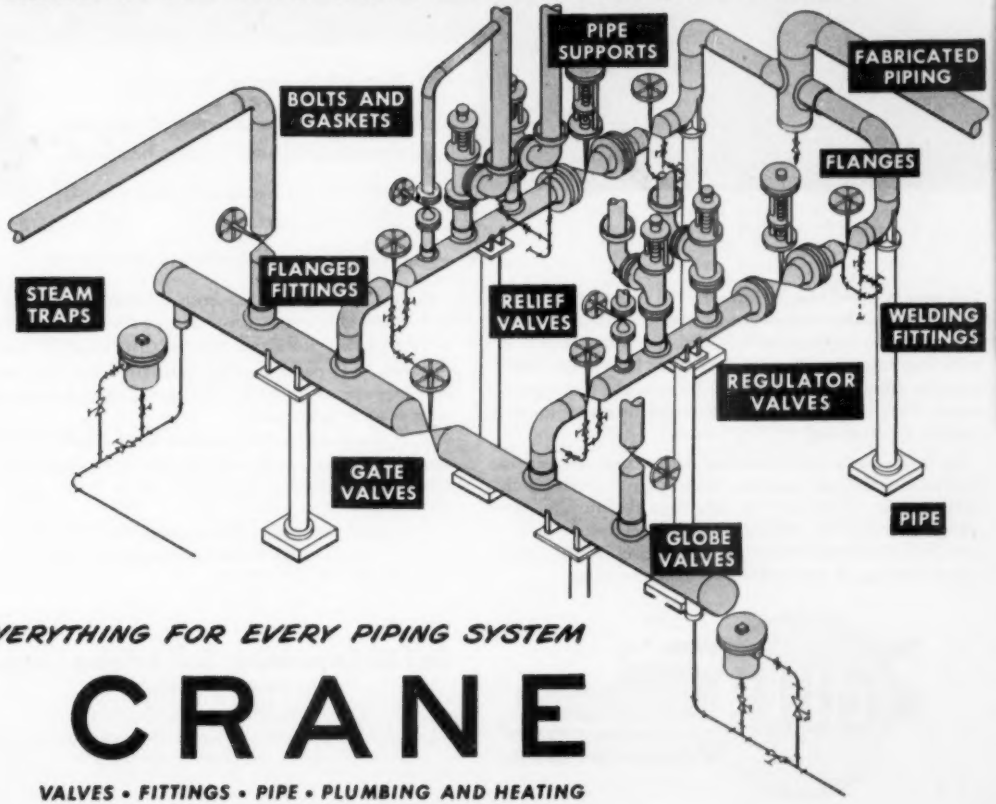

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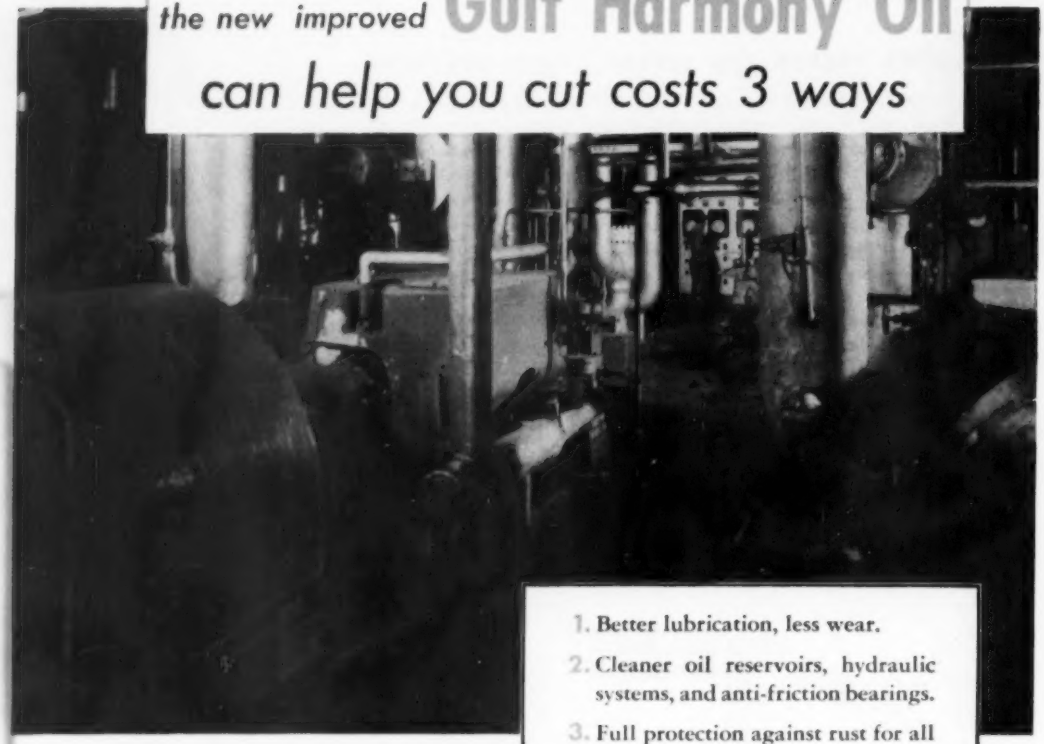

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The new improved Gulf Harmony Oil provides the kind of protection that means lower maintenance costs and freedom from lubrication troubles. Users report that it is the best lubricant they have ever used for pumps, compressors, blowers, and other oil-lubricated plant equipment. They also report excellent performance in hydraulic applications.

Gulf Harmony Oil is enriched with a remarkable new oxidation stabilizer—another important Gulf Research development. This additive improves the already outstanding oxidation stability of Gulf Harmony Oil—gives it exceptional resistance to sludging. In oil lubricated bearings it far outlasts competitive oils.

Gulf Harmony Oil has been fortified to provide an even more effective rust preventive film. Now you can be sure of full protection against rust for all oil-bathed surfaces. It is particularly effective for ball and roller bearings operating under wet conditions. And it separates readily from water.

This outstanding oil provides more effective protection for bearings, gear units, hydraulic mechanisms and compressor cylinders. Available in a wide range of viscosities.

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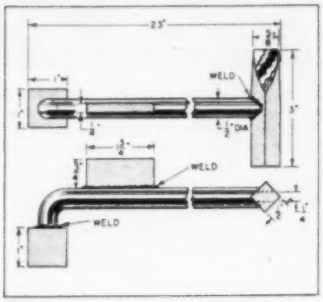
Universal Wrench for Opening Drums

Contributed by Jared Beynon, Allis-Chalmers Mfg. Co.

AT OUR PLANT IN Pittsburgh, Pa. we had been using four to six different size wrenches to open drums. It was hard to distinguish one from another at a glance, and they were easily misplaced. The four-in-one wrench shown solved the problem.



A wrench of this type can successfully be used to open practically any drum

Proper Care of Safety Belts

Contributed by Robert Gilliford

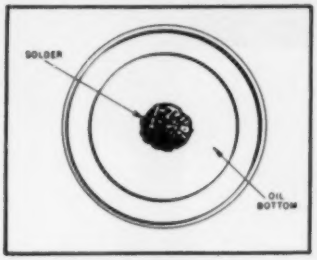
ONE FACT THAT is often overlooked in the maintenance of tools and equipment is the fact that body belts and safety straps need cleaning and dressing with saddle soap about four times a year; oftener if the leather frequently becomes soaked with perspiration or the items are used during wet weather. The saddle soap routine plus the application of neats-foot oil to the leather at least twice a year keeps the straps and belts in good condition and adds materially to their service life.

To clean and dress the body belt and safety straps, first wipe off the loose dirt with a damp sponge. Rinse out the sponge, squeeze out as much moisture as possible and rub it with a mild, alkali-free soap to produce a thick lather. Rub the leather with the lathered sponge to remove perspiration and dirt, and wipe off the excess moisture with a clean rag. Then, again rinse out the sponge, squeeze it as dry as possible, and apply saddle soap to work up a lather. Rub all parts of the belt and safety strap with the sponge until the saddle soap is well worked into the leather. Let the belt and strap dry in a shady place and then rub the leather well with a soft, dry rag.

When it is necessary to use oil on the leather, do this only after cleaning with a mild soap and before the belt and strap have dried. Applying the oil to dirty or dry leather may cause the material to rot. Use only a small amount of neats-foot oil (never use machine oil or vaseline), just enough to spread on and work it into the leather with the hands without giving the leather a greasy appearance. If too much oil is used, the leather will stretch and tend to pick up sand and grit that may damage the material. After the oil has been applied, let the belt and strap dry slowly in a shady place for at least a day. Then rub the leather well with a soft dry rag to remove surplus oil.

This simple system is a sure way to obtain maximum life and safety from every belt and safety strap.

Spring Bottom Oiler



Where steel spring bottom oilers are used for lubricating machinery, it has been found that cracking of the bottom metal can be eliminated by the application of a drop of solder about the size of a quarter dollar to spring bottom

Drill Press Adaptor Speeds Work at Martin

Contributed by The Glenn L. Martin Co.

A DRILL PRESS adaptor, to replace the sleeve adaptor commonly used on high-speed drill presses, has been developed at our plant by Anthony J. Rose, Jr.

This adaptor was originally developed because of the difficulty of keeping sufficient high-speed drills in stock. The new adaptor makes possible the use of drills right down to the shank, avoiding the necessity of frequent replacements, and requiring only the re-grinding of drills.

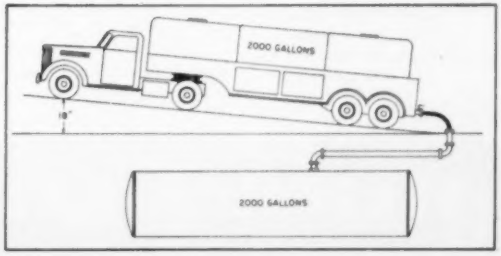
In the new adaptor, the air tube

Oil Dock Ramp Insures Full Measure

Contributed by Paul C. Ziemke

MY FIRST experience with bulk oil delivery occurred several years ago at our country club. Careful measuring with the dip stick indicated that we were not getting all the oil we were paying for. With oil at $1.63 a bbl it warranted a bit of sleuthing on our part. Therefore, we installed a hastily-built wood ramp just ahead of the truck's front wheels. When the tank had, apparently, run dry, we had the driver pull onto the ramp and we found that at least ¾ of a barrel was returning to the tank farm each trip.

Later, an assignment at a large manufacturing plant gave me a second opportunity to check on the delivery method employed there. The large ventilating fans in the enamel spray departments caused a negative pressure in the building. Every hole and crevice in the building sucked air like a banshee. This, coupled with heavy use of process steam burned a lot of oil and a similar ramp installation proved to be a good investment. During the month of January, the four daily trips of the 2000 gal tank truck netted us a considerable saving we could not have attained otherwise. Every trip we got "Gospel Measure."



An 18 in. ramp will drop the rear end of the truck sufficiently to insure complete drainage of tank

NEW! NEW! NEW! NEW! NEW! NEW! NEW!

MEASURES POWER WITHOUT INTERRUPTING SERVICE !!

GE Hook-On Wattmeter

Type AK-2

Now you can measure a-c power on non-metered loads without cutting conductors or interrupting service! Just clip the long voltage leads to terminals or binding posts, snap the hook around the conductor, and you're ready to read.

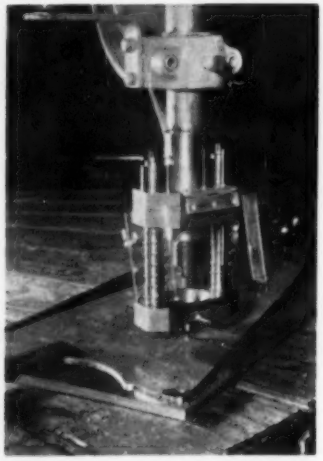
Ideal for trouble shooting, power surveys, and many other industrial applications, this new instrument is as easy to use as its older brother—the G-E hook-on volt-ammeter. It's simple to use, easy to carry—only weighs 3½ pounds.

With the AK-2 wattmeter you can measure power in either single-phase or polyphase circuits. Reactive power in balanced polyphase systems can be checked by using the AK-2 in combination with the AK-1 hook-on volt-ammeter. For this and other G-E testing instruments see your local G-E distributor, or write Apparatus Dept., General Electric Co., Schenectady 5, N. Y.

LIST PRICE $84.75
Type AK-2 Ratings
3-6-20-60-200-300 kw
15-600 amperes
100-600 volts

GENERAL ELECTRIC

602-174



This drill press adaptor, with the Plexiglas shield, makes possible the use of drills right down to the shank, avoiding the necessity of frequent replacement; requires only regrinding of drills

enters from the rear of the adaptor, spirals at the base, and returns to the rear, throwing the chips out in that direction, avoiding the hazard to eyes of chips spiralling in all directions from the drill.

One of the most important factors in the new adaptor is that it can be changed easily. With the sleeve adaptor, it was necessary to remove the adaptor completely in order to insert a new drill, and then the sleeve had to be replaced. Under the new method, the drill can be changed without removing the adaptor.

The fact that the new adaptor leaves the drill and chuck exposed makes possible the use of a Plexiglas shield through which the operator has a clear and unobstructed view of the operation.

Because of the greater weight of the new adaptor, it is easier to pull the arm into position, lessening fatigue for the operator.

Chips do not accumulate inside the adaptor to clog the drill as they do when the sleeve adaptor is used, since the new adaptor leaves the chuck and drill exposed.

Aluminum and Concrete Panels

A REVOLUTIONARY type of building panel was employed in construction of the Aluminum Company of America's new office building at the Davenport, Iowa works. Essentially, the structure consisted of 962 cast aluminum panels secured to the building's structural steel frame.

These unique panels, measuring 4 ft by 7 ft.-3½ in., weighing 162 lb each, were backed with 4 in. of light weight concrete. Construction successfully passed Underwriters' tests for a 4-hr fire wall.

(Continued on page 52)

★

DEMPSTER DUMPSTER SYSTEM

SERVING COST-MINDED MANAGEMENT FROM COAST TO COAST

. . . handling bulk materials of every description at phenomenal savings

Photos show the three simple stages of servicing a container. The Dempster-Dumpster, operated from hydraulic controls by driver in the cab, picks up each container and hauls it to point of disposition where it may be dumped or set down intact.

★ GULF – *recognized across the nation*

. . . Gulf Oil Corporation, well known for sound management, uses the Dempster-Dumpster System

Gulf Oil Corporation is among the hundreds of well managed manufacturers, both large and small, who use the Dempster-Dumpster System of bulk materials handling . . . the system recognized across the nation for its efficiency and ability to reduce costs.

There is never an idle moment for a truck mounted Dempster-Dumpster around a manufacturing plant. With a variety of Dempster-Dumpster containers spotted inside and outside your plant, one Dempster-Dumpster, with only one man, the driver, is kept busy servicing one pre-loaded container after another. These detachable containers, ranging in size up to 12 cu. yds., carry pay-loads equal to conventional truck bodies. They are built in a wide variety of designs best suited to the type of materials handled—be they bulky, light or heavy . . . solids or liquids . . . trash or rubbish.

In addition to amazing increases in man-power efficiency . . . greatly reduced investment, and maintenance costs, the Dempster-Dumpster System improves "housekeeping" methods . . . reduces fire hazards . . . provides an easier, quicker, safer and more efficient manner of handling materials. It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers. . . All Designs. . . All Sizes

DEMPSTER BROTHERS • 180 Shea Building • Knoxville 17, Tennessee

A COMPLETE SYSTEM...

FOR INSTANT, ACCURATE CHECK ON LIQUID
OR BOILER WATER LEVELS THROUGHOUT THE PLANT

Yarway Remote Liquid Level Indicator with Control Unit attached.

Now you can have constant check-up on water levels wherever —and whenever—you want.

The Yarway Liquid Level Indicator, equipped with Yarway Control Unit and auxiliary electric signalling devices, provides this check at two or more locations anywhere in the plant.

The Yarway Indicator is always accurate because it is operated by the liquid itself. Indicating mechanism is never under pressure. There are no stuffing boxes. Complete separation of indicating and actuating parts is achieved by permanent magnet transmission.

The Automatic Control Unit is attached directly to the Indicator and operates the remote signal alarms (light or horn) at any remote locations.

The Control Unit may also be used as a control for mechanical equipment such as motor-operated valves, pumps, etc.

FOR COMPLETE DESCRIPTION AND SPECIFICATIONS OF YARWAY REMOTE LIQUID LEVEL INDICATORS, WRITE FOR BULLETIN WG-1822.

YARNALL-WARING COMPANY
145 Mermaid Ave., Philadelphia 18, Pa.

NEW!
A RECORDING BOILER WATER LEVEL INDICATOR — THE YARWAY HI-LO-GRAPH. SEE BULLETIN WG-1830.

Yarway Remote Hi-Lo-Alarm Signal Horns.

Three Yarway Remote Hi-Lo-Alarm Signal Lights, showing low level, normal operation and high level. Each unit shows all levels.

YARWAY REMOTE LIQUID LEVEL INDICATOR

The Crabgrass Season Is With Us Once More

Many beautiful industrial plant lawns are ruined about this time of year because of lawn grasses' Public Enemy No. 1—Crabgrass . . . One research company did something about it and came up with a dry-applied powder which leaves the useful grasses strictly alone and cuts down coming year's crabgrass by doing away with seeding of the pest

CRABGRASS IS A friendless plant, being completely devoid of usefulness. It goes under a variety of aliases, among them water-grass, summer grass, fall grass and wine grass. During the hot, summer months it chokes out good grasses; with the first fall frosts it dies and leaves ugly brown patches to show throughout the fall, winter and spring.

A new herbicide now places a smooth, velvety lawn within the reach of the industrial plant gardener crew without resort to spraying, hand-plucking or other arduous, time-consuming methods and without harm to desirable grasses.

One of the principal ingredients of the dry-applied powder is a complex organic mercury. In combination with other ingredients, including a dye, the organic mercury is impregnated into expanded vermiculite by a spraying operation. The result of the operation is a green powder of granular consistency which can be applied either by hand or with a two-wheeled lawn fertilizer spreader.

During application, the grains fall on the crabgrass blades, fastening themselves firmly as moisture is absorbed from dew after sundown. Once anchored, the powder spreads its chemical through the crabgrass plant causing it to wither and die.

Depending on the extent of the infestation, two or three applications are required at intervals of a week or two. These repeated applications make certain that no crabgrass in the area has been by-passed in the treatments.

Experiments by scientists of the developing company and independent experts over the past several years have determined that the most ideal period to inaugurate treatment is in July and early August when the crabgrass is growing most actively and before the plants drop their seed. Crabgrass is an annual which propagates itself by dropping seed in the fall which produce new plants the next year. Application of the powder interrupts this cycle by prematurely killing the parent plants with the result that there is no new harvest of seed to infest the lawn the following spring.

Areas cleared of crabgrass can be immediately sowed with lawn seed. Late summer and early fall provide near-perfect growing conditions for seedling grass with the result that a perfect lawn can be established for fall and winter enjoyment.

The new herbicide is equally effective against both major varieties of crabgrass—the small and smooth ischaemum and the tough, large, hairy matting Digitaria sanguinalis. Last year both types of crabgrass flourished as never before, taking over lawns where their presence had not been suspected, and causing distress to industrial plant gardeners and lawn enthusiasts in many parts of the country.

The crabgrass killer is best applied with a two-wheeled mechanical spreader, although a perforated shaker will do for smaller areas. It is recommended for application in the late afternoon—preferably when rain seems unlikely for at least 12 hours. Earlier rain may wash away the herbicide before it gets a chance to affix itself to the crabgrass. Mowing should be delayed for several days after treatment.

After being applied, the crabgrass killer is neither sprinkled, brushed in or otherwise disturbed. It is simply left alone to go to work on its victim. About a week or two later, another application may be made.

If the infestation is especially bad, the rate of application can be doubled and confined to only one or two treatments—in which case the unwanted invader will be repelled more quickly. In this event, gardeners rake up and destroy the browned crabgrass, and hasten the rejuvenation process by feeding, seeding and watering the spots.

Readers who want additional information on this herbicide may have it by using the postage-paid card, elsewhere in the issue. Write "Scutl" on the card, drop it in the mailbox.

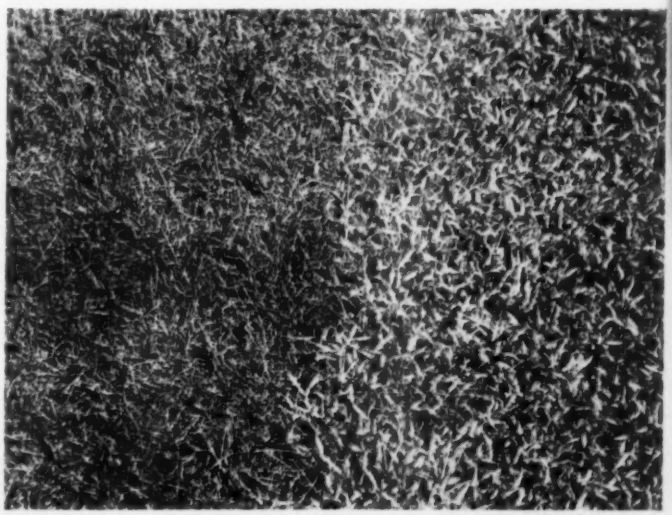


Photo: Scott Lawn Research

Results of application of the herbicide are visible in the photo. Portion at left was treated and the crabgrass disappeared; in contrast the good grass is being outgrown, at right, and smothered by the crabgrass. Brown, dead patches result

MAINTENANCE IS VITAL
For Instance, at Du Pont's Sabine

The maintenance man, at Du Pont as elsewhere, plays a vital role in the high-level, low-cost of production in this highly competitive market . . . This company spends some $55,000,000 a year to keep its various plants fit . . . The photographs on these pages show what the cameraman found in a tour with one of Du Pont's 11,000 maintenance workers

THE modern industrial plant no longer considers maintenance as a necessary evil; it can and is used as a most effective production tool. Recently, Du Pont honored its 11,000 maintenance men by covering, pictorially, a week's work by Shift Mechanic Harry Gunter.

To keep the complex, costly equipment of a modern chemical plant in top operating shape is the maintenance man's job. Economic and efficient production rests, to a large extent, on his skills. And a smooth-running plant spells high output and low costs, vital factors in the highly competitive chemical market of today.

Du Pont spends some $55,000,000 a year to keep its plants fit. It has more than 11,000 maintenance men qualified to repair everything from a tiny motor to building-size production units.

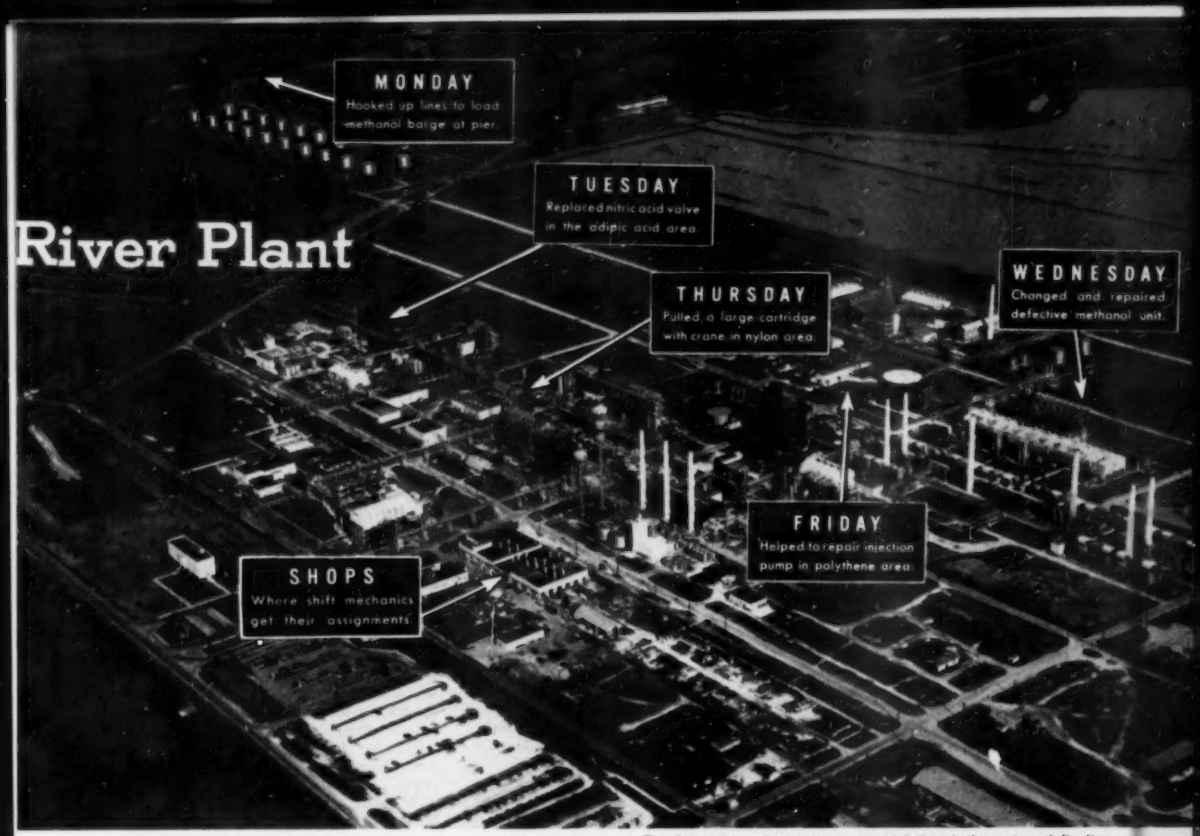
A plant like Polychem's Sabine River Works in Texas has as many maintenance men as operators. One is Shift Mechanic Harry Gunter who, like the country doctor, relies on a combination of native intuition, judgment and know-how to carry out his assignments.

In an average week Mechanic Gunter tackles up to 30 different jobs all over the plant. Some require but a few hours, others involve hours and stretch from shift to shift. To do this, Gunter uses simple but numerous tools. Altogether, his 74-lb tool kit includes 84 assorted wrenches, ratchets, chisels, pliers, screw drivers, gages, files.

In order to help the maintenance crew as much as possible, Du Pont has a company-wide program that is constantly turning up new and better ways of handling specific jobs.

One of the "must" jobs finds Mechanics Gunter and Amos Walters teaming up to make a change of a methanol valve

Industrial safety is adhered to strictly at Du Pont. Here Mechanic Gunter prepares tags to indicate dangerous fluids

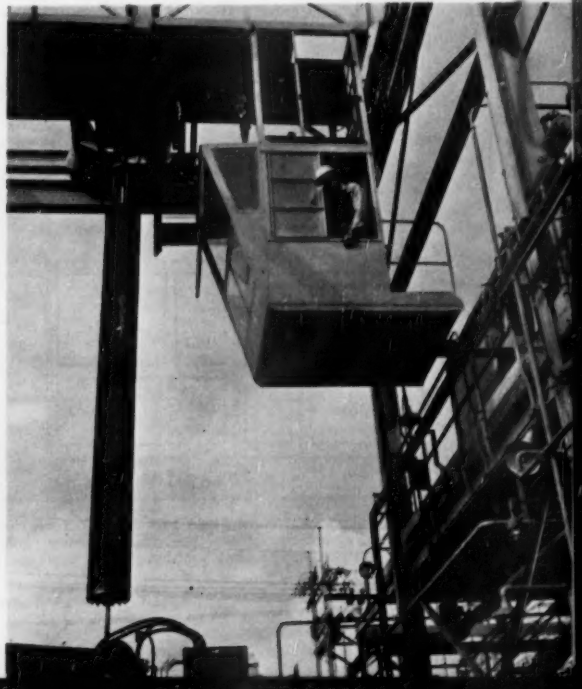

River Plant
MONDAY
Hooked up lines to load methanol barge at pier.
TUESDAY
Replaced nitric acid valve in the adipic acid area.
THURSDAY
Pulled a large cartridge with crane in nylon area.
WEDNESDAY
Changed and repaired defective methanol unit.
FRIDAY
Helped to repair injection pump in polythene area.
SHOPS
Where shift mechanics get their assignments.

The photographs on these pages are presented through the courtesy of Du Pont

Aerial view of Du Pont's Sabine River Plant shows how Shift Mechanic Gunter covers the plant in a typical week. In a plant of this type many skills, from pipe fitters to instrument mechanics, are needed to keep production rolling smoothly. New findings of maintenance men at this plant are passed along to make work easier, faster at other Company plants

Single chemical pump on which Mechanic Gunter works has 79 separate parts. He must be able to repair, reassemble units

Many of the mechanics at Du Pont must "double in brass." Here, as crane operator, he pulls a cartridge in diamine area



Build Economy and Efficiency Into SHOP OFFICES

Through strict attention to details, space allotments, modular sizes, stock sizes, stock millwork, ready-made ductwork, a lot of dollars can be chopped off the shop office building costs . . . Details of structure and materials . . . refinements of structure . . . Installation of modified air conditioning . . . Provision for heating coils in locations needed

By A. M. ELLIOTT, Plant Engineer

PRIVATE OFFICES for plant supervisors are becoming standard plant equipment. Merit ratings require confidential talks. Piecework rates, production schedules, quality control, personnel records and shop drawings must now be kept in better surroundings out of the din and dust. The real reason for the non-appearance of these wholly necessary tools of management in a large number of shops has been the cost. This is an unjustified fear. The plant carpenter shop or an outside neighboring woodworking concern, plus a sheetmetal man, electrician and painter can erect serviceable partitions of a semi-permanent nature for as little as $3.50 a square foot including modified air-conditioning.

Since each unit may be entirely different because of individual departmental requirements, the method used in arriving at sizes will be explained below. Based somewhat on the War Department's space allotments published in 1942, a person of superintendent's rank should have at least 80 sq ft of space; one of foreman's rank, 65 sq ft. A clerical allowance of 50 sq ft should be made for each individual. A further allowance of 5 sq ft for an active file, with 3½ sq ft inactive, has been found desirable but is elective and may be omitted if the number of cabinets is kept to a minimum. Where a department's needs are large, primarily because of shop drawings, it has been found more efficient to place these drawers outside. This reduces traffic in and out of the office.

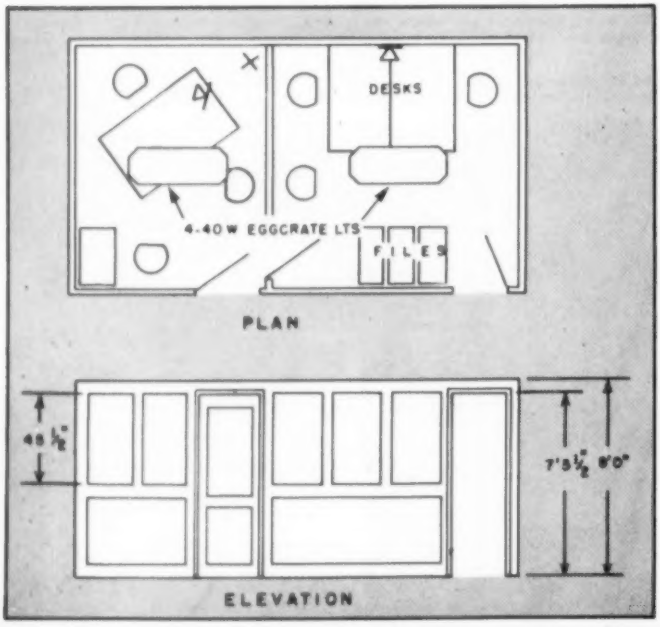


Fig. 1. Office for superintendent and two clerks. Note that clerks' desks are arranged so that either can answer the common phone. Files have been placed in the room as shown in the sketch although no allowance was made for them

In Fig. 1 a representative unit for a superintendent and two clerks is shown. From the aforementioned allotment we have: superintendent 80 sq ft; clerks 100 sq ft; file allowance omitted.

Since the superintendent is to have a private enclosure we have two offices 80 and 100 sq ft each. In the building of these offices it is well to take advantage of standards as much as possible. It will allow for expansion or alteration and other future contingencies. Standardization also gives us flexibility and portability in addition to lowered costs.

A plain panel material, painted white, is highly satisfactory for the partition walls or as a base on which to cement acoustic tile if desired. Coming in sheets 4 ft by 6 ft, 4 ft by 8 ft, or 4 ft by 10 ft, these dimensions are completely modular for our 80 sq ft, if we make the superintendent's office 8 ft by 10 ft and the other office 10 ft by 10 ft.

Having decided these basic dimensions we now try our hand at laying-out the furniture and locating the doors with a view to maximum efficiency. Although it is known that placing two desks back-to-back does not represent the ultimate in desirability it does, in this instance, seem the most practical from a standpoint of economy; one telephone is equally handy to both clerks.

Once this layout is approved we are able to proceed with the structural details. We will assume that the location of doors and one office in relation to the other is frozen because of the surrounding shop.

A 44½ in. wainscoting or wall, from the floor to proposed windows, allows about 14½ in. above the average desk for protection, semi-privacy, book stop or pin-ups. This is not too high to destroy line-of-sight vision to the outside. The 8 ft over-all height gives good head clearance under the proposed lighting and does not face us with the problem of handling unwieldy panels between fabricating point and erection site. Furthermore, there is no

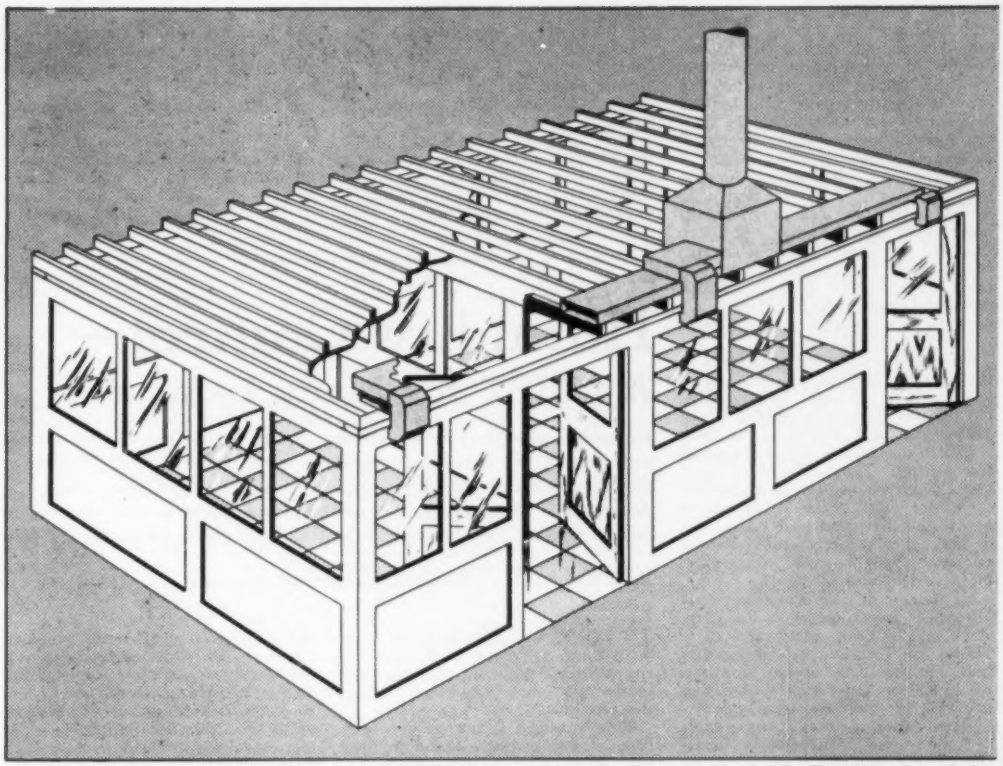


Fig. 2. Practically all of the pertinent over-all details of the structure are shown in this sketch. Variations from design can be made to fit individual plants and varying likes and dislikes of occupants being consistent with good practice

problem of flimsiness to necessitate additional bracing. Such bracing would not be difficult to provide but would mean added expense of extra labor and material with no improvement in appearance.

Framed in stock of varying widths the lower panels are of ¼ in. 3 ply with a good heavy baseboard 6½ in. high. Glass installation is most easily provided by rabbeted frames and molding tacked in with brads, over the glass. Glass can be installed before painting or after, depending on whether a spray or brush job is planned.

While the plant carpenter shop is making these panels, the millwrights can be installing the angle straps that are to make the structure secure. Stock of mild or cold rolled steel, 6 in. long by 1 in. wide by 3/16 in. thick is employed. In each piece 3 holes have been drilled and countersunk and the pieces are then bent into 90 deg angles with the legs approximately 4 in. by 1½ in. in length. Drilling of holes in the concrete along the line of partitions for 5/16 in. screw anchors may be done ahead of time if measurements are closely watched. The plan is to fasten the straps with the 1½ in. dimension on the floor. The 4-in. leg will be fastened to the baseboard by two 1¼ in. flat head woodscrews. It has been found that one strap in one corner on each side, about 4 in. from the meeting of each partition, is sufficient. However, at doorways, a strap both inside and out seems advisable to compensate for the load induced by door slamming.

Once the walls are up a 2 in. by 4 in. plate should be set along their tops. Further strength and some refinement may be added by fastening ¾ in. by ⅞ in. quarter round to the mating sides of wall and topping plate.

Where on load is intended above the ceiling the 2 in. by 4 in. joists may be placed on 24 in. centers. This is not as shown in the sketch. These members should be notched at each end so they will fit down over, and flush with, the bottom face of the plates. It then becomes a simple matter to fasten up the 4 ft by 10 ft panels. The structure is now ready for the primer coat.

While the carpenters are hanging doors and installing the hardware the plumbers can run lines for the three sprinkler heads required. Electricians should be able to start the wiring. Provision should be made for electric office machines and other devices needing wall outlets. For adequate diffused light, of 25 to 30 footcandles, two eggcrate style fluorescent fixtures with four-40 watt, 3500 or 4500 white tubes, are installed. These, of course, should not be installed until after the painting has been completed.

Shown in Fig. 2 is an installation of modified air-conditioning. The extent of modification is a matter of choice. Primary function is to introduce fresh air into the office to overcome fumes, lethargy, cigarette smoke and dust. Knowing the cubic content of the enclosure and what impurities we must combat we must determine the number of air changes necessary. This information is available in any fan catalog, most handbooks or can be obtained from your local fan agent. However a few words of explanation may be helpful to show that there is nothing complicated or involved in achieving satisfactory results.

The 1440 cfm, in the offices, if changed every two minutes would be able to handle odors equal to those of the average kitchen. This then gives us 720 cfm of free air. Since there will be a certain amount of stack loss, elbow friction etc., we should allow a higher value. A filter, such as used in a home forced-air system, introduced into our line is

positive guarantee against soiled cuffs and working papers. This filter, if installed, makes the aforementioned higher value imperative. Too, by letting the air enter the office in slightly greater volume than it is forced out we are able to keep the interior under slight pressure, as insurance against dusty desks.

Looking up the tables in the manufacturer's folder we find a 12 in. diameter fan with a fractional horsepower motor drive will more than fill the need. To help control temperature on cooler days it may seem advisable to slow the motor down and speed it up during warmer periods so a variable speed control is purchased with the fan.

The stack is located as shown in the sketch simply to give us a shorter run. It may, however, be located anywhere convenient. Room outlets are best placed in the door walls, so the path of the air is across the ceiling. This diffuses it as it goes. Both convection and thermal difference will cause it to return across the floor and under the door or through a grille provided for the purpose. This reduces drafts and blind or stagnant air spots.

To determine the size these outlets are to be we return to the 12 in. stack and its cross-sectional area of 113 sq in. To achieve uniform distribution from the room openings we know we must stay within that total. So, for the three runs or openings we cannot exceed 37 sq in. each. It is, of course, permissible to locate the stack at one end of the structure and come off with one trunk diminishing in size at each outlet.

Some Important Details

However, following our announced plan of economic standards we think ready-made duct-work will do the job. Our supply catalog shows a single wall pipe which comes in 2 ft sections and in a number of sizes. The 3 in. by 12 in. size fits nicely into our scheme as the small reduction in area may compensate through increased velocity, for any friction loss. Two 90 deg elbows provide each outlet.

Thus, our custom-made tinsmithing requirements are now at a minimum. The junction box for the trunks, housing for the filter, and square-to-round at the stack, are incorporated in one plenum made over-large for two reasons. It provides a stabilizing effect on the air coming through the filter, makes easier a change in direction of the air entering the trunks, and provides space wherein to introduce heating coils if needed.

Heating coils, for tempering the air, may be provided by installing a finned type radiator made into a suitable coil and hooked into the nearest steam line. Should the office be so located that there is no steam handy, other sources of heat may be found. The plenum or junction box can take care of most needs.

Location of the variable speed control should be such that it is within reach of the clerk whose duties require the most constant attendance in the office.

Duct openings in the header above the windows may be faced with any large mesh screen or perforated sheet metal. Odd pieces of flattened expanded metal can be sheared slightly larger than the openings and fastened with a small bevelled wood molding. Painted the background color they become neat and inconspicuous.

As an interesting psychological twist on this air-conditioning deal, mental impetus may be given the success of the installation by simply fastening a couple of pieces of ribbon to the grill so they flutter in the breeze and draw attention.

Humidity Control—
A MUST for Many Industries

Humidity, whether you want it up higher or down lower, is seldom satisfactory for industrial processes or machinery . . . Control of humidity in either direction can be accomplished in several ways . . . Author tells about equipment available and about variable factors to be controlled . . . Methods of calculating heat and moisture relationship

By ROBERT H. EMERICK, Consulting Engineer

IS SOME OF YOUR plant machinery, or perhaps a plant process, content with the surrounding temperature but complaining about the humidity?

This question is not in the least flippant. For instance, if the ambient humidity is too high, machinery dissatisfaction will show up as progressive corrosion, sometimes pitting, particularly on polished surfaces and delicate mechanisms. Even such stodgy characters as reduction gears will acquire the junk pile look, long before their time, if the moisture present in their casings is not to their liking. Centrifuging the oil may not always placate them; nothing less that air conditioning in addition, is demanded.

If the relative humidity is too low, some machines will express displeasure by erratic performance, particularly machines designed to handle hygroscopic materials. For instance, in certain bag-making and bag-printing machines, changes in weight and texture of the material cause the handling fingers to jab in, rather than merely hold down, with dismaying disruption to production.

Humidity and temperature, together, may be controlled industrially for any size of job. The drawing for example, shows a pair of controlled rooms designed by the author, for the curing of concrete. The steam room is exactly what it says: low pressure steam is allowed to escape into the room to maintain a constant steam bath at approximately 140 to 160 F. In the fog room, the temperature will be kept constantly between 60 to 70 F, throughout the year, with a relative humidity of 100 per cent. Humidification in the fog room is accomplished by an Armstrong humidifier, using steam as the vaporizing agent, with a fan to keep the room air in motion, while the desired conditions are being established. Conditions in both rooms are maintained automatically, thereby limiting human responsibility largely to the business of running the batches in and out of the rooms, together with the keeping of records.

Introduction of moisture into the air is not difficult. Primarily, we do it quickest by spraying water into an air stream, the system most familiar to us, and illustrated by the conventional air washer. Given enough water, and big enough fans, we might conceivably, with air washers, humidify the Great American Desert.

On smaller scales, we all know what happens when we set a pan of water on a stove or radiator, and this simple practice is improved by using saturated materials, like filters, in place of the pan. If we force the air through the wet material with a fan, then our rate of humidification takes another spurt. These methods of pan and wicking are the conventional home approach, and we take whatever relative humidity we get. If the cold walls begin to sweat, we control the situation by catching up the pan with one hand, and the mop with the other. Despite the limits of this practice, we might find it cheap and generally satisfactory for spaces of limited extent, such as optical laboratories, offices, lounge rooms, etc. Even some measure of automatic control is possible if a fan

is part of the apparatus; the humidistat than starts and stops the fan, perhaps metes out the water supply in addition.

If our problem is one of constant humidity, or of carefully controlled humidity, then the all-out methods of the water spray will require some alternate or supplementary treatment. To reduce the 100 per cent relative humidity of the air emerging from the showers, we can: a—squeeze out some of the moisture by chilling the air with refrigerated coils; b—dry it up with a dose of silica gel, either administered by a machine built for the purpose, or by strewing bags of the stuff in the area; or c—mix in enough lower humidity air to produce the exact blend we want. Alternately, we can obtain commercial units in any size, designed for the controlled humidity of the air leaving their inner sanctums; some of these use a liquid as the humidifying and dehumidifying agent, others are dry. The important fact is, that we can, if necessary, bring contentment and improved efficiency to any piece of machinery, or process, that needs it.

Also, there is available an air contactor cell in which the air is humidified, or dehumidified, as desired, using a proprietary liquid as the treating agent. In this unit, certain odors will be absorbed by the liquid, and these, together with the surplus moisture, are driven off later, in a remote piece of equipment called a regenerator. Steam and water connections are required to complete the cycle, in this system.

Controlling humidity is one way to inhibit the accumulation of static electricity. While many of use have suspected that the presence of moisture simply increases the conductivity of air and thereby permits a constant leak-off of static electricity, the real facts as explained by researchers, are somewhat different. Actually, if the air is moist, some of the moisture penetrates many of the surfaces which it touches, and these infintesimally wetted surfaces are the true conductors which lead the static to the ground. Air itself, whether wet or dry, is a mighty poor conductor.

In winter, when the relative humidity of outside air is low, there is insufficient moisture to penetrate material surfaces, which is one of the reasons we can emit sparks after walking across a rug in cold weather, while the same journey in summer seems merely to make us sweat. Actually, the generation of the static goes on both summer and winter, but the perspiration on our skins in summer bleeds off the electricity as fast as our walking creates it.

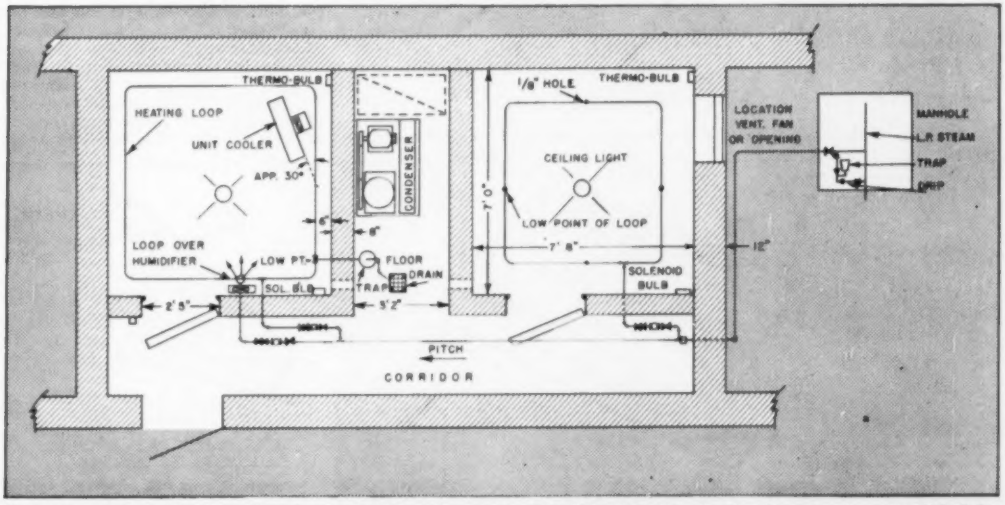
There is no particular relative humidity to which we can point and say, "Above that value we are in no danger from static electricity." The reason for this originates in the wide diversity of materials that become conductors in moist air. A little moisture provides high conductivity in some; a great deal of moisture produces very limited conductivity in others. A relative humidity of 45 per cent is called safe by some authorities, not less than 75 per cent by others. The National Bureau of Standards suggests the latter figure and prudence would lead us to this value also, if our atmosphere tends to be explosive. We must remember moreover, that humidification for the control of static electricity, should be used always as a supplementary treatment, and not as the whole prescription. A positive conductor, leading to the ground, is far more sure than is the moisture in a machinist's overalls.

In contemplating the control of humidity to benefit industrial processes and machinery, the effect on human beings in the area seems more likely to be neutral than otherwise, unless extreme ranges are wanted. Tests reported by the ASHVE indicate that most people are unable to identify any change in humidity between the limits of 30 per cent and 70 per cent. As for the reactions on the mucous membranes there is no reported proof from controlled experiments that warm, moist atmospheres are better or more healthful than warm dry ones. On the other hand, tests indicate that hot and moist air definitely is more likely to cause abnormal respiratory conditions among industrial workers. This evidence suggests that we should watch the upper limits for human reactance rather than the lower.

The critical line for metal corrosion may be considered at approximately 65 per cent. Above this value, corrosion accelerates rapidly, particularly if the air temperature also is high, say above 75 F. Apparently human surfaces and metal surfaces have this one common characteristic—they both resent hot and humid atmospheres. We might remember this in our plans for temperature and humidity control.

If we are interested strictly in drying, there is a possible complication in the practice that, under certain conditions, must be considered. This complication is the release of heat that often accompanies the adsorption process, especially if the adsorbent is non-liquid. With a liquid of course, the flow will carry away the extra Btu. This heat is the

(Continued on page 94)



Two rooms designed by the author for use in the curing of concrete. Humidification in the fog room is accomplished by a humidifier, using steam, and with a fan to keep air in constant motion following principles outlined in article

How to Construct a Templet for Making PIPE BENDS

Here is one way to make a set of inexpensive templets to aid in cutting pipe for "stove pipe" bends . . . All that's needed for the job is a few machine screws, wing nuts, composition board of some type, and pieces of thin sheet metal . . . Various sizes can be made up for different size pipe and any angle wanted can be obtained by varying angle of positioning plate . . . Then, just slip the templet in place, tighten the set screws, chalk the line, cut and weld the piping

By F. C. GEIBIG, Development Engineer, The Linde Air Products Co.

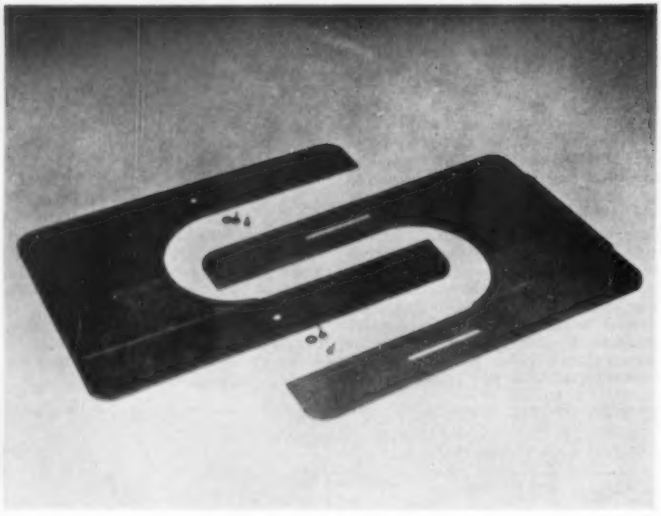


Fig. 1. Parts of the templet and the assembled templet in an "exploded" view

ANY PLANT PIPE SHOP, plumber or steam fitter plant group, which works continually on piping construction and replacement of any type, can profitably use a set of templets to lay out bends for welded pipe. Such templets will reduce to a matter of a few minutes the time required for the accurate marking of pipe for bends of practically any angle and including any number of pieces.

There are no difficult formulas to figure out nor are there any complicated patterns or layouts to make in the templet described here. First, it is necessary to figure out the angle of the particular bend desired. In this article we have confined ourselves to discussing 90 deg bends in a variety of pieces (see Fig. 3). Then the templet is simply slipped over the pipe, positioned, and the line of cut marked off with a piece of chalk or soapstone.

Practically every shop in the country has the necessary material laying around. The templet consists of two pieces of composition board or plywood, that have been cut to fit

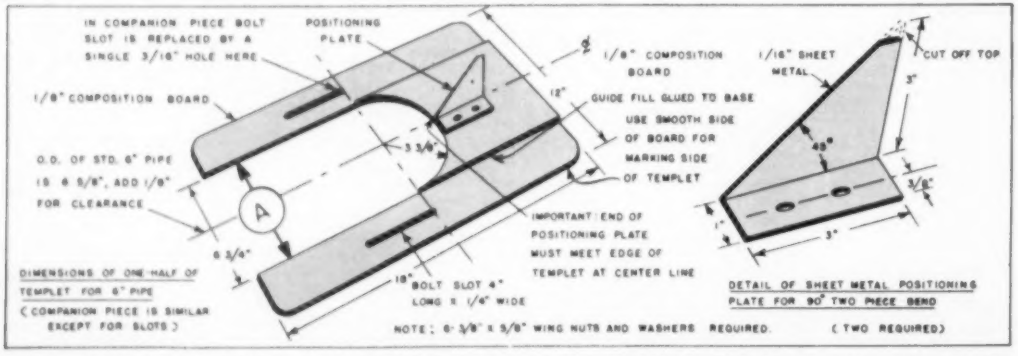

IN COMPANION PIECE BOLT SLOT IS REPLACED BY A SINGLE 3/16" HOLE HERE
POSITIONING PLATE
1/8" COMPOSITION BOARD
O.D. OF STD. 6" PIPE IS 6 5/8", ADD 1/8" FOR CLEARANCE
A
6 3/8"
3 3/8"
12"
1/8" COMPOSITION BOARD
GUIDE FILL GLUED TO BASE
USE SMOOTH SIDE OF BOARD FOR MARKING SIDE OF TEMPLET
IMPORTANT: END OF POSITIONING PLATE MUST MEET EDGE OF TEMPLET AT CENTER LINE
18" BOLT SLOT 4" LONG X 1/4" WIDE
DIMENSIONS OF ONE-HALF OF TEMPLET FOR 6" PIPE
(COMPANION PIECE IS SIMILAR EXCEPT FOR SLOTS)
NOTE: 6-3/8" x 5/8" WING NUTS AND WASHERS REQUIRED. (TWO REQUIRED)
1/16" SHEET METAL
CUT OFF TOP
3"
45°
3/8"
1"
3"
DETAIL OF SHEET METAL POSITIONING PLATE FOR 90° TWO PIECE BEND

Fig. 2. Details for making the templet for a 90 deg bend in 6 in. pipe. To make templets for other sizes of pipes simply add $\frac{1}{8}$ in. to the outside diameter of the pipe and make this figure the dimension for the point "A" on the sketch

snugly around the pipe. When closed the cutouts form a circle that is the same diameter as the pipe. When opened, the templet can be tilted and made snug to the pipe at almost any angle. Figure 5, for example, shows the templet snug against the pipe at a 45 deg angle.

While the sketch, Fig. 2, shows a templet that was made for a 6-in. pipe, the same directions can be employed in making templets for any size pipe. The dimension of the opening at "A" is the really critical dimension and this is arrived at by simply adding $\frac{1}{8}$ in. to the outside dimension of the particular pipe for which the templet is being made. All other dimensions, of course, are variable at will to fit the conditions. So, if a shop is regularly working with pipe of two or three different diameters it would be well to make tempets fo reach size of pipe. It will pay, in the end.

Construction details of the templet for making 90 deg, two-piece bends are given in the drawing, Fig. 2. As already explained, templets for other sizes of pipe can be easily made. For other angles of cut, make additional positioning plates as shown in Fig. 3. Plates similar to these can be made fo rany odd angles which may be desired.

Determining Centerline

First step in using the templets is to determine the centerline of the pipe to be marked. Block the pipe up well so it will be stationary. Then, with a square and level mark the center of the pipe as shown in Fig. 4. Without moving the pipe, make several other marks at intervals along the pipe. Then, draw a line through these points and you have the centerline.

To make a 90 deg angle as shown in Fig. 5, slip the templet over the pipe, place the positioning plate flat on the surface of the pipe and along the centerline. Draw the two parts of the templet together and tighten the wing nuts. Next, hold the templet steady and lay out the cut around the pipe by sliding a flat soapstone, or chalk, along the templet surface.

Cutting Pipe

Now, the pipe must be cut. Make a miter cut by holding the blowpipe in the same position as you would a saw. After cutting, bevel the edges of the cut ends to form a vee for welding. This is best done by holding the blowpipe at an angle of about 30 to 45 deg and moving it toward you. Then, rotate one section of the pipe 180 deg and make the weld. Melt both edges of the pipe joint all the way to the inside wall.

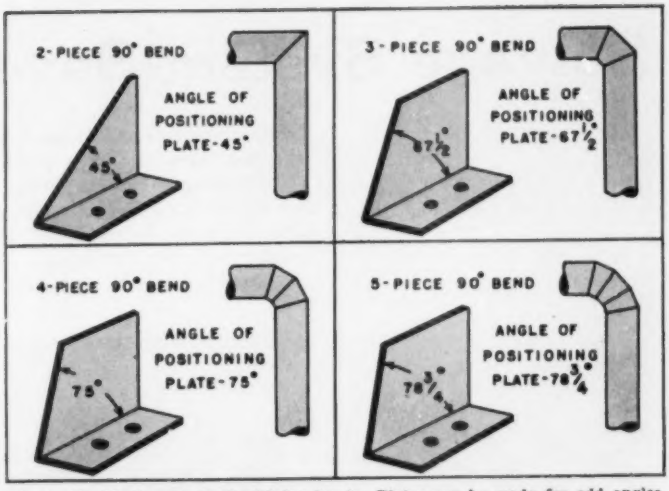


Fig. 3. Positioning plates for 90 deg bends. Plates can be made for odd angles

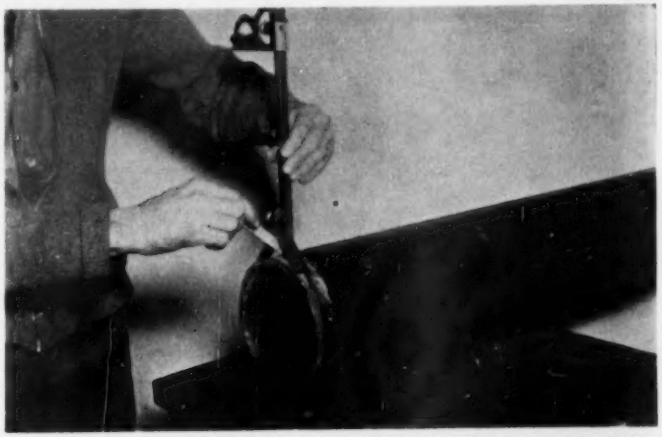


Fig. 4. First step in using is to position the pipe securely and get centerline

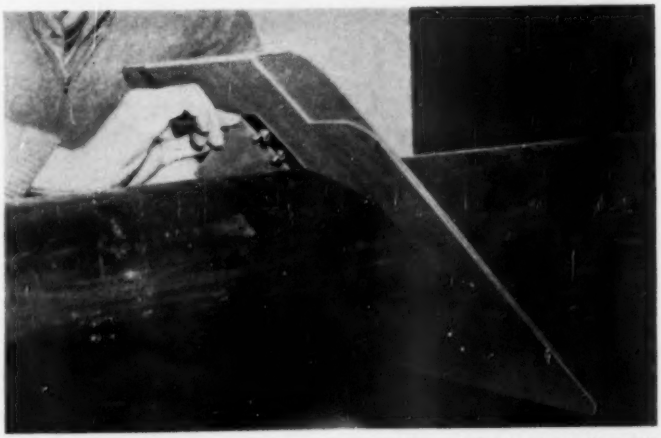


Fig. 5. Plate must be placed exactly on the centerline and the templet held snugly

Salvage System Saves a Million

Good coordination and cooperation between all sections of the company last year saved this large plane manufacturer more than $1,000,000 . . . Screening of surplus listings dropped in tangible amount in 1949 but this points up effectiveness of program . . . Value of materials saved for re-use are aside from the millions of pounds of scrap metal, wood, paper and other items . . . Value of re-usable salvaged hardware was placed at $217,000 . . . Even sweepings are examined for savings

Fig. 1. Aggregation of company-owned stand-by and surplus items in storage at "Y" Building. Among causes for surplus items are downward changes in the need for materials, changes in tooling practice and revised safety stipulations

Fig. 2. Thousands of bolts, nuts and similar items are hand screened by the Conservation Department. Last year, Conservation hand-sorted, screened, identified and returned to stores as usable 5,663,643 nuts, bolts, other hardware

SURPLUS Administration, the Material Review Board and the Conservation Section, in cooperation with all affected groups in the Engineering, Manufacturing, Customer Relations and Financial Divisions, last year saved Glenn L. Martin Company more than $1,000,000*—through screening of excess material, parts and equipment, and the salvaging of scrap.

Surplus Administration, representing the office of the Controller, is responsible first of all for the coordination of all activities concerned in the proper handling of both Government-owned and Martin-owned surplus items, as well as for their storage and out-shipment or transfer to Conservation for salvage or ultimate scrapping.

The Conservation Section, besides its primary function of gleaning usable and saleable material from scrap, participates along with Engineering, Tool Engineering, Production, Procurement and Surplus Administration itself, in the periodical screening of all items that appear on the tentative lists of disposable surplus. These listings embrace materials, parts and equipments classified either as excess or obsolete.

The fact that screening of surplus listings yielded a *tangible* economy of only $360,000 in 1949, against a saving of $540,000 during 1948, points up the increased efficiency of the over-all program of control in operation within the various departments concerned. Surplus Administration has contributed substantially in this connection by recommending procedures aimed at minimizing the excess. Government-owned items are physically removed from active stock and stored in the so-called Termination Warehouse, awaiting Government shipping instructions.

Items excess as a result of company responsibility are normally Martin-owned. Such items are steadily being reduced through Surplus Administration's screening program, which reflects the integrated alertness of the several operating

*This amount does not include recovery of $151,000 from scrap sales, and more than $5,000,000 from sale of surplus which could not be diverted to use through screening and salvaging. This represented 90% of original cost.

departments—supplemented by the scrutiny of Conservation. Items are constantly being deleted from the list by the Material Control Section of the Production Department, as new requirements arise. Those found to be usable, are put to work. About 20 per cent of the items on the tentative lists of excess are thus utilized, the remainder being referred to Procurement for disposal.

Martin-owned surplus is retained in the custody of the declaring department until actually sold. Advantages inherent in this policy of non-segregation, whereby materials and equipment that have been listed as excess remain in the hands of the declaring department until ultimately disposed of, include a saving of storage space and the elimination of moving costs, as well as of any damage which might occur during in-plant transportation. Government-owned items, as noted, must be separately warehoused as soon as they have been declared surplus.

Among the causes for excess items are downward changes in the need for materials, changes in tooling or manufacturing requirements, revised safety stipulations, altered vendor or sub-contractor conditions and reductions in the number of production units. Items cover a broad range, from excess aluminum sheeting and obsolete assembly fixtures, to electric motors, typewriters, crash boats, wire, machine tools, trucks and drawing tables. Over 12,000 separate excess items were listed and screened during 1949.

The operating departments are constantly seeking improved methods of handling which will reduce the amounts of surplus generated in the manifold activities of the plant. A highly developed program in the Engineering Division, for example, is yielding important results. Utilizing of potentially excess material to meet requirements of new contracts as well as those already under way, is paying off handsomely.

The Production Department helps a great deal in this effort, through its preparation of lists of potential surplus items covering all contracts. One evidence of the value of this system lies in the fact that the original assembly tooling for the Martin Model 2-0-2 was available, after several years, when the new TWA and Eastern Airlines orders materialized recently—calling for twelve 2-0-2's and sixty-five of the improved Model 4-0-4 plane.

Planning & Operations Control is well along on a comprehensive analysis of material-control procedures, looking toward further refinements and economies. This study should result not only in a retarded accumulation of excess and obsolete items, but should smooth out the flow and facilitate adaptation of usable production material even before it reaches the point of becoming listed as surplus.

The Surplus Administration Section, in addition to the several functions already outlined, maintains detailed records of the status of all surpluses.

Fig. 3. Interior of the Termination and Master Change Records warehouse. Navy and Air Force surplus items are held in this warehouse awaiting shipping instructions. Customer-owned items are the responsibility of the Surplus Administration

Fig. 4. Non-salvageable paper is disposed of by incineration, at handling rates up to 110 boxes full daily. A highly efficient system, embracing all steps in sweeping-up, sorting and hand-screening of trash has been developed and perfected

Items remaining on the surplus list after all screening measures have been exhausted, are disposed of by Procurement to established business houses—for resale. In many cases, as many as 200 separate bids go out to prospects all over the country, the goods being sold in large lots to the highest bidders. Non-saleable items are then turned over to the Conservation Section, as scrap.

Exercising an independent function, Quality Control and customer representatives—through the medium of Material Review procedures—divert many parts and assemblies back to the production line. Parts found to be beyond drawing tolerance are thoroughly investigated for possible use. Tools and procedures are corrected to avoid errors in the production of these parts thereafter.

In addition, parts and assemblies purchased from vendors or subcontractors and found in error during installation or operation, are carefully screened against warrantees and contract specifications for

(Continued on page 48)

Lubrication Possibilities With the Silicone Greases

High and low operating temperatures have, for a long time, created problems . . . Both organic and semi-inorganic lubricants are trying to find their place in the plant picture . . . In this article the author states the case for the silicones and points out just where and how they have proved of greatest benefit . . . On paint conveyors, oven conveyors, instruments, in corrosive atmospheres . . . Uses as a permanent lubricant in motor bearings . . . Tables of properties, uses

By C. C. CURRIE, Dow Corning Corp.

TRENDS TOWARD increasingly high and low operating temperatures have created difficult problems for bearing manufacturers and for plant and lubrication engineers. This problem has been partially solved by the development of special high and low temperature organic greases such as the polyoxy alkylenes and diesters. These special purpose greases are generally satisfactory if only one of the two temperature extremes is involved or if the total span of operating temperatures is in the range of 300 degrees, from a minimum of —80 F to about +225 F.

The usefulness of silicone greases in bearings operating at extremely high and low temperatures has been established by laboratory testing and by performance under actual service conditions. A brief review of the performance data that has been assembled during the past few years will indicate the limitations as well as the advantages of these semi-inorganic lubricants.

There are four silicone greases now available in commercial quantity. A brief description of these four greases and their fields of major usefulness are given in Table I.

Silicone Grease 41 contains a heat-stable silicone fluid thickened with a special grade of finely divided carbon. It is designed for the lubrication of conveyor systems and similar slow moving equipment operating at extremely high temperatures. Silicone Grease No. 33 is designed for use in ball and roller bearings operating at temperatures ranging from —100 to +300 F. It is a soap base grease prepared from a heat-stable silicone oil with a very low freezing point. Silicone Grease No. 44 is designed for the permanent lubrication of high-speed, high-temperature ball bearings. Valve Seal A, as its name implies, is used to lubricate valves and packings exposed to a variety of corrosive materials at high and low temperatures. It is a translucent grease prepared from a silicone oil and thickened with silica.

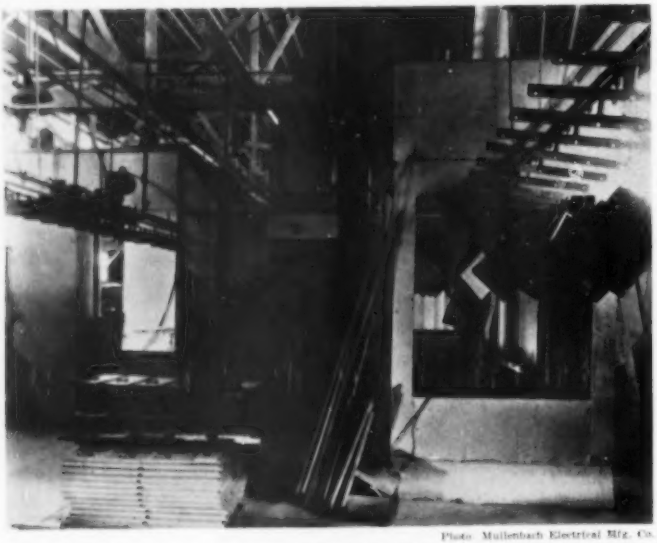


Photo: Muilenbach Electrical Mfg. Co.

Fig. 1. Bearings in conveyor system carrying freshly painted electrical equipment through an oven with temperature of 375 F. Thus far the company's records show that relubrication has been required only twice a year since using silicone greases

On Paint Conveyor System

Silicone Grease No. 41 is the most heat-stable of the silicone greases discussed here. It is widely used as a lubricant for oven conveyor bearings because of its extraordinary heat resistance and non-melting characteristics. This grease is most effective in slow moving equipment but it has been successfully applied to anti-friction bearings operating at speeds up to 2000 rpm.

Continuous exposure to temperatures in the range of 375 F has little effect on the properties of this grease. Prolonged use at temperatures above 375 F will cause eventual thickening and will necessitate relubrication. Relubrication schedules for open type ball and roller bearings range from once a week to once every several weeks depending upon the operating temperatures and speeds and upon how corrosive the atmosphere may be. Sealed bearings packed with Silicone Grease No. 41 are relubricated at intervals of one to several weeks by introducing 2 to 3 drops of a silicone fluid, 710R. After several oilings, fresh grease is added and the cycle is repeated.

For example, an automobile manufacturer was plagued with almost constant maintenance on a paint conveyor system carrying body parts through an oven at 450 F. In spite of all the lubricants and lubricating methods employed the bearings became so stiff after the system was shut down for a day or two that

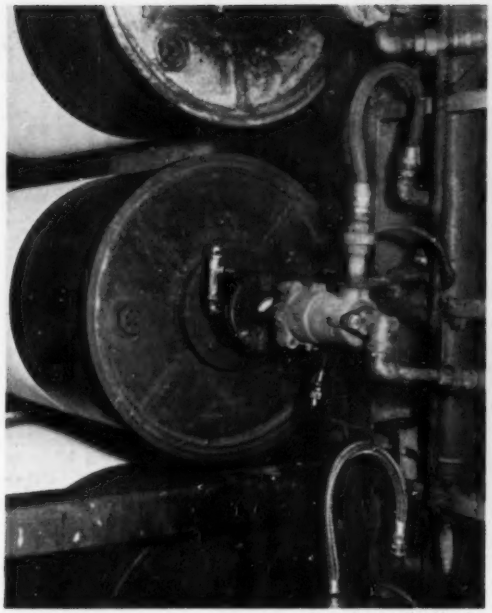


Photo: American Finishing Co.

Fig. 2. Silicone grease in the ball bearings on these drying cans has shown a startling useful length of life. The drying cans operate at 400 rpm around steam heated journals

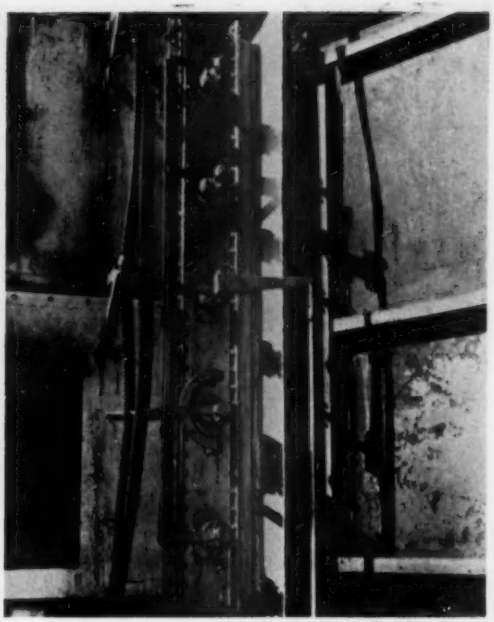


Photo: Dow Chemical Co., Texas Div., Freeport

Fig. 3. Valve Seal A silicone grease has been used since 1945 to minimize maintenance costs and reduce corrosion in these multi-vane type dampers operating at 350 to 400 F

the full power of the motor and the pulling power of 10 to 15 men were required to start the conveyor. Under such strain, the steel connecting-links were frequently broken. The use of Silicone Grease No. 41 has eliminated bearing seizure, broken links and high power consumption. The bearings are simply relubricated once every three months with No. 41 and oiled once a month with 710R.

An electrical manufacturing company was similarly troubled by bearing failure and grease dripping on freshly painted parts in an oven conveyor system, Fig. 1, operating at 375 F. Even with weekly relubrication, bearing failure was common. That difficulty was eliminated by cleaning the trolleys and packing them with No. 41. These bearings are now relubricated only twice a year and there have been no bearing failures in more than two years of operation.

Number 41 is also used to lubricate the roller bearing casters of oven carts that are loaded with 1000 to 2000 lb of refrigerator units and wheeled into an oven for 4 hr at 325 F. This operation is repeated 4 or 5 times a day. The bearings which were previously relubricated as often as several times a week are now relubricated only once every two or three months with No. 41.

Silicone Grease No. 41 has been used for the past 2½ yr to lubricate six core oven conveyor systems. Each conveyor unit includes about 1200 trolley bearings and four, 6-in. roller bearings that are mounted in the ovens. These conveyor systems are operated for 16 hr a day, 5 days

Table I. Physical properties of silicone greases and summary of application data for the four types discussed in the text

Tested for	Silicone No. 41	Silicone No. 33	Silicone No. 44	Valve Seal A
Color	Black	Grey	Brown	Translucent
Penetration[1], W60	260-300	250-270	250-270	.....
Solidification Point, °F., less than	–30	–100	–45	–50
Melting Point[2], F., more than	none	400	415	none
Maximum Bleed[3], per cent at 230°F. at 400°F.	 3.0 6.0	 2.0 3.0	 1.0 2.0	 ... 7.0
Applications	Conveyor trolleys, oven bearings, and other slow moving equipment operating at 200 to 500 F.	Antifriction bearings exposed to very low temperatures or in services where minimum change in torque over a wide temperature span is required.	As a permanent lubricant for sealed ball bearings or in antifriction bearings exposed to high temperatures.	Plug valves and pumps operating at high or low temperatures in contact with various corrosive chemicals or steam.

[1] ASTM D217-48.

[2] Melting point determined on a magnesium bar with a cartridge heater fitted into a drilled hole at one end. A strip of grease is extruded onto the bar and a thermocouple is then used to determine the temperature of the bar at the point where the grease melts.

[3] Values determined with equipment specified in ANG3a. Samples held at indicated temperatures for 24 hours.

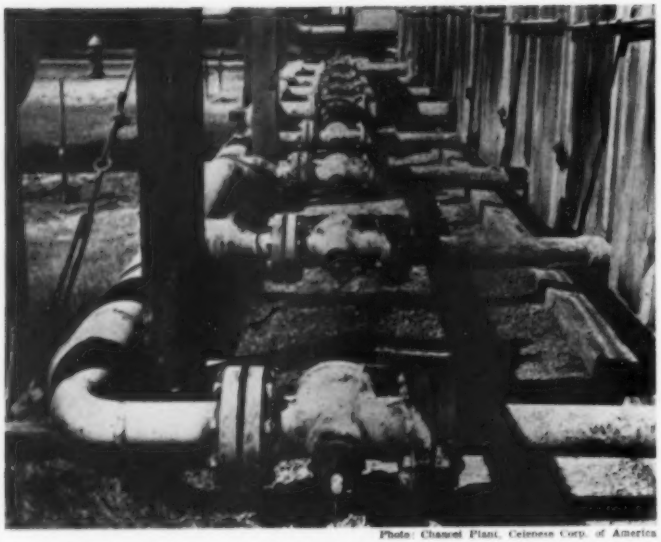


Photo: Channel Plant, Celanese Corp. of America

Fig. 4. These four high-pressure air valves, foreground, are lubricated with silicone greases to increase their useful operating life, and also to prevent sticking

a week. They carry engine cylinder block and head cores through ovens in which the hottest spot temperature is 700 F. The conveyor speed is such that each bearing is in the oven for 2½ hr out of every 4 hr. The trolley bearings are relubricated once a week and the large roller bearings are lubricated once every two weeks with No. 41. Maintenance problems have been eliminated; labor costs have been reduced; and power consumption has been reduced by more than 80 per cent.

These are only a few of the many applications in which No. 41 has proved its usefulness. Others are summarized in Table II. Silicone Grease No. 41 is most useful at high temperatures and in corrosive atmospheres. The usual temperature range for this silicone grease is from 300 to 500 F although successful applications have been reported at 1100 F. Its principal advantages are: long life at high temperatures; the elimination of contamination due to dripping; reduced maintenance costs and power consumption; and virtual freedom from expensive shut-downs due to bearing failure. Silicone Grease No. 41 is most useful in relatively low speed ball and roller bearings; it has a limited usefulness in journals. It is not recommended as a lubricant for metal gears because it permits excessive wear under extreme pressure conditions. It has been used very successfully, however, as a lubricant for nylon and fiber gears.

Silicone Grease No. 33 is designed for use in ball and roller bearings operating at temperatures ranging from —100 to +300 F. Within that range bearings lubricated with No. 33 show relatively little change in torque. High resistance to centrifuging is indicated by the fact that it has been used successfully in bearings with inner races rotating at speeds as high as 70,000 rpm. It is produced in the four consistencies defined in Table III. The physical properties of No. 33, medium, consistency, are given in Table I.

Silicone Grease No. 33 is used in greatest volume as a lubricant for photographic and optical equipment including camera lens mounts, take-up reels and focusing mechanisms, transit bearings, projectors and geophysical instruments. It is singularly well suited to such applications because it shows very little change in consistency over a wide temperature range.

In the electrical field, it is used in the bearings of clock mechanisms, time controllers, a radar tuning device, microphone switches and in the gears of X-ray machines. It has been used successfully for more than three years as a lubricant for the bronze sleeve bearings of the small synchronous motors in demand meters and time switches. These motors must operate at constant speed in spite of varying climatic conditions. Use of Silicone Grease No. 33 helps to assure the accuracy of these devices whether they are installed in the North where temperatures may drop to —40 F or in the South where internal temperatures may rise to 180 F.

Table II. Summary of application data collected on Silicone Grease No. 41

Application	Temperature, F	Lubrication Schedule
Paint conveyor system	350-500	3 weeks
Paint conveyor system	400	1 year
Oven carts	...	2-3 months
Sanforizer	400	3-4 months
Dollies handling canned food	250	canning season
Oven gears	450	more than 6 wks.
Steam line valve	220-400	8-12 weeks
Oven bearings	700	weekly

Table III. Various consistencies which are available in the silicone greases

Grease	Consistency	Worked Penetration
Silicone No. 33	Fluid	380
	Light	300-320
	Medium	250-270
	Heavy	200-220
Silicone No. 44	Fluid	380
	Light	300-320
	Medium	250-270
	Heavy	200-220

As a Permanent Lubricant

The introduction of silicone (Class H) electrical insulation with a hottest spot temperature rating of 180 C (356 F) puts a premium on the development of a heat-stable silicone grease for high temperature motor bearings. Bearing temperatures as high as 300 F are not uncommon in Class H motors built to give long service at temperatures 200 F above the limits set for Class B motors.

Silicone Grease No. 44, compounded of a heat-stable silicone oil and a lithium soap, was originally designed to meet the requirements imposed by silicone insulation. The physical properties of No. 44, medium consistency, are given in Table I. It is available in the four consistencies defined in Table III.

This silicone grease is characterized by excellent stability at high temperatures and by superior resistance to oxidation and gumming over a temperature span of 490 F from —40 to +350 F. It has been used successfully in ball bearings operating at speeds as high as 20,000 rpm. A top operating speed cannot be set definitely, however, because high speed performance is a function of bearing design as well as linear speed. Physical and chemical properties and performance data indicate that No. 44 is a good general purpose grease which can be used to make permanent lubrication a practical reality in many applications.

The stability of this silicone grease has been well established by its performance in textile mill equipment. For example, the relubrication schedule on fan motor bearings

(Continued to page 90)

TOOLS Needed in a Large Instrument Shop

The author points out that tools are the most inexpensive form of operation insurance; you may think they are expensive until you have to shut down because you don't have enough or the right kind . . . Vises, taps and dies, and miscellaneous hand tools . . . Advantages of good jewelers' lathe in the modern shop . . . Drills and other power tools

By **FRANCIS S. BECKER**, Sun Oil Co., Marcus Hook, Pa.

THE OBJECT of this article is to outline the quantity and variety of tools necessary to successfully carry on the mechanical maintenance of an Instrument Department in any continuous process industry.

The quantity and variety of tools in the ideally equipped instrument shop varies somewhat with the size of the plant and the type of equipment the shop is called upon to service. However, for our discussion, we will assume a shop that is to service the average oil refinery of 100,000 bbl per day capacity.

An oil refinery of this size may have an Instrument Department Personnel of approximately 60 men actively engaged in servicing instrument equipment. Although some refineries of this size divide their plant into areas with a separate shop to service each area, we will assume that this is a compact refinery being serviced from one central instrument shop.

We will further assume that our instrument shop is of sufficient physical dimensions that our force of 60 instrument men can work from this shop and all tools subsequently enumerated and described are for a shop of these dimensions.

In discussing shop tools of any kind we are apt to think primarily of power tools. However, in any instrument shop there are quite a number of hand tools necessary, some of them of a very special nature. Investigation has brought out the fact that the cost of these hand tools exceeds, or at least equals, the cost of the power tools. In view of the quantity and cost of these hand tools, I feel that it is important to discuss them at some length.

One of the most common of hand tools found in any shop is the vise. In my opinion the following different types and sizes are needed:

2—6 in. machinists' vises for heavy duty valve and meter work.

30—2½ in. machinists' vises, or one for every two instrument men, preferably mounted in the middle of the bench space allotted to two instrument men.

6—Portable pipe vises, or one for every ten instrument men.

2—Drill press vises and at least 2 jewelers' vises for small delicate work.

Taps and dies are another common but very important hand tool in any shop. Experience has shown that the minimum quantity and variety needed are as follows:

6—Complete sets of pipe dies and taps from ⅛ in. up to 1 in., or one set for every 10 instrument men.

4—Complete sets of bolt and machine screw taps and dies up to ½ in. in both standard and S.A.E. threads.

In addition to these are numerous miscellaneous hand tools as follows:

6—Sets of copper tubing flaring tools.

6—Sets of copper tubing bending tools.

2—Sets of pipe bending tools up to 1 in. pipe.

6—Sets of hole punches.

6—Sets of gasket cutters.

3—Pairs of straight and curved cutting tin shears.

3—Blow torches (gasoline).

6—Electric soldering irons in various sizes.

6—Rawhide mallets.

3—Sets of depth gauges.

2—Sets of inside and outside micrometers.

3—Acetylene welding outfits.

3—Sets of number and letter stamps.

3—Complete sets of socket wrenches.

3—Complete sets of open end wrenches.

1—8 ft stepladder.

1—4 ft stepladder.

2—30 ft extension ladders.

6—Various weight sledge hammers.

6—Wire brushes.

6—Complete sets of packing tools.

12—Large Stillson wrenches from 24 in. to 48 in.

6—Pairs of wedges for driving flanges apart.

There are also many special hand tools necessary in any instrument shop.

Every shop should be equipped with at least 3 sets of so-called non-sparking tools for hazardous locations. These sets should include open end wrenches, hammers, Stillson wrenches, screw-drivers and wedges.

3 or 4 special wrenches for removing valve seats.

2 or 3 special tools for removing gauge pointers.

Special wrenches for removing parts of meters.

At first glance the quantity of some of these hand tools may seem excessive, but one big plant general shutdown, when all of these tools might be in service will more than pay for the cost of duplicate tools in maintenance time saved.

Each shop should have one electric welding outfit, one small metal break for bending sheet metal to fabricate special instruments, 2—¼ ton chain hoists and 4 small rubber tired carts for hauling valves and meters from location to the shop for repairs.

In addition to the hand tools listed above. It is my belief that every shop should be equipped with the following power tools:

1—Pedestal drill press up to ½ in. capacity for general use.

1—Bench drill press up to ¼ in. capacity for light precision work.

1—Jig saw.

1—6 in. bench grinder.

1—6 in. buffing wheel equipped with wire and cloth wheels.

1—Toolmaker's lathe or equivalent. This item is probably the most expensive single piece of equipment in an instrument shop and careful study should be made of the requirements of any particular shop before deciding on the type of lathe to be purchased.

A good lathe of this type will cost anywhere from $1,000.00 to $5,000.00. There are small lathes on the market of the type built for the home work shop which cost from $100.00 to $300.00, but unless it is a very small shop and price is of the utmost importance they are not recommended for instrument shop use. Whether you spend $1,000.00 or $5,000.00 for your lathe depends on the size of the shop and the quantity of work expected to be produced on it to justify the amount of money you will invest in it.

For the average shop the expenditure of up to $2,000.00 for a lathe is well justified. In our opinion a lathe is a very important instrument shop tool and in a year's time will more than pay for its original cost. It has been our experience that the maintenance machine shops in most industries have only one lathe of this type and it is usually in operation 24 hours a day taking care of general plant maintenance so that it is practically impossible to get any instrument department work done on it.

Another advantage in having a lathe in an instrument shop is that the operator either is an instrument mechanic or is familiar with instru-

From a paper presented at the September meeting of the The Instrument Society of America held in St. Louis.

ment work and emergency lathe work can be greatly expedited by not having to take the time to make detailed drawings of the work to be done.

An electric lathe grinder should be included in the lathe accessories. This tool is very essential in producing highly polished surfaces and also in working with Stellite and other materials which are too hard to machine with a tool.

Three or four sets of drills should be stocked, both for the lathe and for the drill press work. These should be in the number sizes from No. 1 to No. 60 and in the fractional inch sizes from 1/16 in. to ½ in.

In addition to the larger power tools we have already discussed, each shop should be equipped with the following portable power tools:

2—¼ in. pistol grip portable electric drills.

2—½ in. portable electric drills.

1—¼ in. pistol grip portable pneumatic drill for use in hazardous areas where electrically operated equipment would be prohibited.

1—½ in. portable pneumatic drill for the same purpose.

2—Pneumatic impact guns for tightening and loosening orifice flange and valve flange bolts.

2—Paint spray guns.

1—Power hack saw.

1—Hand operated hydraulic pump for hydrostatic tests.

The cost of tooling a shop of this size in the manner we have discussed would be about $2,550.00 for hand tools and $2,665.00 for power tools, or a grand total of $5,215.00

This figure is based on spending about $1,600.00 for a lathe, however if the quantity and quality of work to be handled by the shop warranted a $5,000.00 lathe the total cost of tooling might be increased to as much as $10,000.00 on the assumption that all power and hand tools would also be of higher quality and price.

The sum of $5,215.00 or even $10,000.00 is a very small amount to properly tool an instrument shop of this size when one considers the fact that this shop will be servicing instrument equipment worth about one million dollars. This money spent in tools is well justified when one also considers the time saved in man hours.

How Thick Does It Pay To Insulate?

INDUSTRIAL MINERAL Wool Institute calls the attention of plant engineers to a method of determining the economic thickness to which thermal insulation should be applied—a method formulated by the Public Service Electric and Gas Co. of New Jersey. Public Service has the problem of insulating many hundreds of square feet of high temperature equipment and ducting used in the production of electric power for the densely populated New Jersey area. The question of how thick to insulate constantly arises, and is answered this way by W. E. Somers, the Public Service insulation expert at the Company's Newark headquarters.

Heat is evaluated dollar-wise at each piece of equipment. For example, 1,000 Btu per hr may have a value of $35.00 at a steam turbine, but may have a value of only $2.00 at a boiler feedwater heater. These figures take into consideration not only fuel costs and efficiency, but also overhead and amortization over the capitalized life of the equipment. For example, at the steam turbine cited, a heat loss of 1,000 Btu per hr over the capitalized life of the turbine costs a total of $35.00.

Insulation is first considered to the thickness recommended* for the particular operating temperature in question. For example, a unit to operate at 270 F would normally call for a 1½ in.-thickness of the block form of insulation used by Public Service. If the addition of an extra thickness of insulation would result in a saving of 15,000 Btu per hr, and 1,000 Btu per hr are evaluated at $2.00, then $30.00 (i.e. 15,000 ÷ 1,000 × 2) could be spent for additional insulation. Since this sum would not pay for an extra thickness on most pieces of equipment, additional insulation would not be economical. If 1,000 Btu per hr are evaluated at $15.00, then $225.00 (i.e 15,000 ÷ 1,000 × 15) would be available for additional insulation, and an extra layer would be economical.

When Public Service lets out bids to contractors, forms similar to that shown in the table are given to each contractor. Information is supplied by Public Service in columns 1, 2, 3 4, 5, 6, 7, 9, and 13. The contractor supplies information for columns 8, 10, 11, 12, and 14. The information in column 14 is merely to check roughly the contractor's calculations. If a bid is submitted which obviously has an error in the calculation of the sq ft area, the contractor is given a chance to reconsider. The dollar values of column 13 are

(Continued on page 48)

*Commercial Sandard CS117-49, "Mineral Wool Insulation For Heated Industrial Equipment" U. S. Department of Commerce.

Forms similar to this one are used by Public Service Electric and Gas Company when letting out bids to contractors

OWNER'S DWGS.	INTERNAL or EXTERNAL APPLICATION	COVERING THICKNESS High Temp. (in)	COVERING THICKNESS Low Temp. (in)	CEMENT THICKNESS (in)	HARD FINISH CEMENT THICKNESS (in)	INSULATION PROTECTING CEMENT THICKNESS (in)	WEATHERPROOF FINISH CEMENT THICKNESS (in)	MAX. TEMP. (F)	MAX. SURFACE TEMP. (F)	NORMAL TEMP. (F)	NORMAL SURFACE TEMP. (F)	BTU. LOSS PER SQ FT PER HOUR (based on Normal temp. and 80 F ambient	GUARANTEED HEAT CONDUCTIVITY—High T.	HEAT EVALUATION $ per KBtu per hr	AREA (sq ft)
Hot Air Duct A.H. to Burner	Int.	3½	—	—	—	1	—	690	*133	660	*129	*65.3	*.502	$ XXXX	6607
Primary Air Duct	Int.	3½	—	—	—	1	—	690	*133	660	*129	*65.3	*.502	$ XXXX	1292
Tempering Air Duct	Int.	1½	—	—	—	1	—	80(a)	*		*	*	*	(a)	96
Pulverizer Air Duct	Int. & Ext.	3½	—	¼	¼	1	—	690	*133	280	* 98	*21.3	*.420	$ XXXX	3582
Recirculating Air Duct	Ext.	3½	—	¼	—	—	¼	690	*133	660	*129	*65.3	*.502	$ XXXX	334
Dust Collector Hoppers	Ext.	1½	—	¼	—	—	¼	314	*	284	*	—	—	p	3675
Induced Draft Fans	Ext.	1½	—	¼	—	—	¼	300	*	270	*	—	—	p	1377

* —Btu per sq ft per degree temperature difference per hour per inch. (Normal temp. and 80 F ambient) p —Protection only
(a)—Insulate for 70 F differential between air in duct and outside air * —Contractor to furnish information in spaces marked thus

No Gingerbread Here!

Sandwiches for Plant Construction

This concrete-cellular glass-concrete sandwich has lowered building costs, cut construction time, is light weight and makes possible more usable floor space . . . Can be cast on-the-job or pre-cast in the factory and shipped to the site . . . Permits cast-in glass block fenestration or openings for conventional windows . . . Moisture vapor travel minimized or completely eliminated, cutting building maintenance costs

A PROVEN ANSWER to the perennial question of the sandwich wall has recently been given in the more satisfactory use of insulated panel walls on modern buildings, both in the United States and Canada.

Insulated panel walls have been successfully used in three ways: as a spandrel system, a vertical system, and even to fill entire bays. This indicates complete design freedom when using the insulated concrete panel wall on modern, multistory commercial and industrial buildings.

The design of this insulated panel wall will undoubtedly set a pattern for future curtain walls employing different veneers. However, the basic design of the panel is standard. It is a big, flat sandwich of any practical size and thickness desired. Most important is the use of a solid core of cellular glass insulation which stabilizes the veneers. Second, is the use of concrete veneers, processed by heavy mechanical troweling, steam-curing, and/or vacuum incorporation of these components into a sound panel wall, made in-the-flat, by mass production techniques. These panels can be made at the building site, but they have been fabricated as much as 100 miles away and shipped by rail to the point of erection.

In addition to those benefits which are inherent in the concept of any good curtain wall, this insulated concrete panel wall offers greater insulation value, improved moisture resistance, and may be salvaged for re-use in building expansion.

Located on the St. Lawrence River, at Trois Riviers, midway between Montreal and Quebec, the retail and wholesale office building of Hobbs Glass, Ltd., has proved in service every advantage apparent in this type of wall construction. Not only the wall panels, but everything above the foundation of this building was pre-cast. Although there were changes as the job progressed —as there are when any new idea is tried out for the first time—the final installed cost was lower than comparable construction, something under $2.00 per sq ft of exterior surface.

At Trois Riviers, the wall panels were made in-the-flat on the job, cast against canvas. An attractive interior mat finish, ready to paint, was achieved. The exterior veneer was made dense through the use of the vacuum process and by floating the exposed wall surface with heavy mechanical troweling equipment.

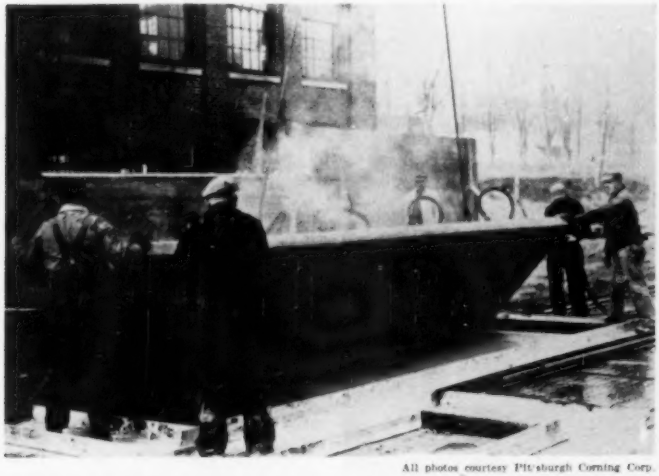
Not satisfied with just fabricating successful sandwich walls insulated with cellular glass, the contractors cast-in glass block fenestration while the panels were being made in-the-flat. A simple device was used. It consisted of a piece of 1-in. plywood with strips attached to hold the glass block while the usual wall ties and waterproof mortar were inserted. This device raised the glass block fenestration enough to provide an inner and outer sill, jamb and head effect.

The insulated concrete panel walls in this building measure 18 ft 6 in. by 6 ft 8 in. by 5 in. The wall thickness was made up of 1½ in. concrete, 2 in. cellular glass insulation, and 1½ in. concrete. Since the walls are but 5 in. thick, there is more usable floor area than would be available with conventional construction.

Generally speaking, the insulated concrete panel wall is less than half as thick as any alternate construction. The popular thickness now used is 6 in. instead of the 12 in. and 14 in. furred, lathed and plastered wall commonly constructed. The wall panel may be any thickness consistent with structural or building code requirements, by varying the thickness of either veneer or the cellular glass core. This should increase the usable floor area approximately 72 sq in. for each running foot of floor perimeter. In most commercial buildings, this added space provides two dollars, or more, income per square foot per year.

During two of the coldest winters, the building was easy to heat, according to the officials at Trois Riviers. Although the walls are only half as thick as the usual alternative, they have more than twice the insulating value. Better insulation is a primary feature of this cellular glass concrete panel wall. The overall thermal conductivity ("U" value) is about 0.16 Btu per hr per sq ft per deg F in the 6 in. section. Reducing the concrete veneer thickness has little effect on thermal conductivity.

Experience at this Canadian in-



All photos courtesy Pittsburgh Corning Corp.

Fig. 1. Twenty-four hours after it was cast this insulated concrete panel wall is lifted from its casting frame. Hoses from back operate vacuum lifting device

stallation has also proved the moisture vapor resistance of the panels under service conditions. The cellular glass insulating agent stops moisture vapor migration from one side of the wall to the other. The closed cells of the glass bubble slabs are completely impervious to moisture and when used in suitable designs of panels can minimize, or completely eliminate, moisture vapor travel. This makes it possible for the engineer to establish his extreme-design-condition dew points within the cellular glass and thus assure himself that condensation cannot take place within either veneer. This results in a substantial reduction in maintenance costs on any veneer used.

Should the owner of this building —or any other structure using the same design for panel walls—desire to enlarge his facilities, the insulated walls can be salvaged and re-used by removing panels and re-erecting them. This will produce a substantial saving in remodeling costs and afford flexibility to design plans.

It is evident from what was done here that the insulated panel wall is adaptable, regardless of floor plan, window arrangement or structural skeleton. Practical limitations are the only restrictions on panel wall sizes. They may be hung on the frame, like the true "curtain wall," or in some designs they may carry their own weight.

It is important to note that more than sufficient strength, without massive weight, is provided by these new panel walls. In the simplest design (2 in. concrete veneers with 2 in. cellular glass core), the panel resists forces three or four times the wind load limit. Of course, almost any strength requirement can be met. Cellular glass offers a permanently rigid core of high compressive strength for the concrete veneers.

Building construction stops when winter sets in up in New Hampshire. To win the race with snow and cold, the Cocheco Woolen Manufacturing Co., at East Rochester, N. H., decided on a spandrel installation of panel walls so that their new building could be enclosed before winter. Originally, the structure was designed for common brick walls.

Three sizes of spandrel sandwich panels with cellular glass cores were used: 9 ft by 9 ft, 6 ft by 18 ft and 6 ft by 22 ft. All had 2 in. concrete veneers and a 2 in. cellular glass core.

As a result of using this lighter, speedier construction method, the owners saved substantial sums in foundation and erection costs. Furthermore, the panel wall has an insulation value several times that of the brick wall they might have installed.

The installed cost of the panel walls per square foot was about $1.65 in this particular case. The figure may vary in other parts of the country, depending on factors peculiar to each building area, so it should not be taken as a general overall cost applicable anywhere. However, the construction costs are lower for cellular glass insulated concrete panel walls than for even the conventional common brick masonry wall. This saving is reported to amount to a dollar per foot or more.

Since fire resistance is of vital interest it is important to note that the entire cellular glass concrete panel is made of non-combustible materials.

A sample panel, consisting of 1½ in. concrete and 1¼ in. concrete veneers with a 2 in. cellular glass core, was tested on a comparative fire test furnace using the Standard ASTM Time-Temperature Curve. The result was a rating of three and one-half hours. This exceeds the fire test requirements of the amended New York City Building Code by more than one hour and a half.

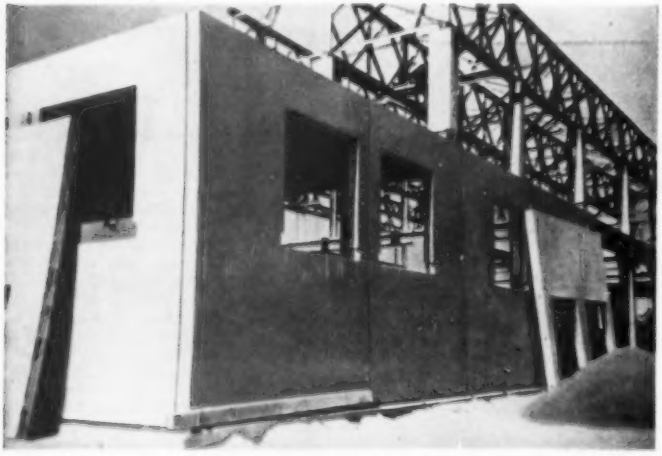


Fig. 2. Completed insulated wall panels are shown here in place on the garage and service building of the Hydro Electric Power Commission, Ontario, Canada.

Salvage Operation

(Continued from page 41)

approximately 1,000,000 parts and/or assemblies were processed by inspectors of the Material Review Board. About 35 per cent of the total parts screened were returned to the production line—saving $350,000.

The Conservation Section of the Manufacturing Division, which was responsible for gleaning $337,000 worth of salvage out of the scrap accumulation in 1949, cost the company about one fifth of one per cent of the total overhead for that year. The value of items salvaged for reuse was in addition to the proceeds of nearly 4,000,000 pounds of aluminum, steel and other metal scrap.

A highly efficient system, embracing all steps in the sweeping up, sorting and hand-screening of trash for salvage purposes, has been developed and perfected at Martin's. Segregation of items on the shop floor by use of separate receptacles for many of the items, mechanical equipment for sorting, and scientifically arranged bins for the hand-screening operations are among the features. An extra burden does fall upon quality control.

Last year, Conservation hand-sorted, screened, identified, inspected and returned to stores as usable—5,663,643 nuts, bolts, screws, clips and other hardware, valued at $217,000. One operator, for example, handles 4,165 Cleco clamps per hour, checking each for size and damage. Wood salvage amounted to $20,113 in 1949, and metal scrap to $131,000, while $120,000 worth of waste was circumvented in terms of small tools, loose-leaf binders, boxes, grease, and other miscellany.

Insulation Thickness?

(Continued from page 46)

blocked out as confidential information.

The following procedure is used to select the lowest bidder. Assume two bids are received, one offering a job costing $700 which when completed will allow a loss of 50 Btu per sq ft per hr; the other, at a cost of $500, allows a loss of 70 Btu per sq ft per hr. Suppose the area of the unit being insulated is 6,600 sq ft and that 1,000 Btu per hr at this stage of the system is worth $2.00. The value of the lost heat on the $700 job would be $\frac{6{,}600 \times 50}{1{,}000} \times 2$ or $660. This plus $700 gives a total of $1,360. Following the same procedure, the total cost of the $500 job would be $1,424.

Plaster and Masonry Fastenings

In this article the author describes several well known types of fasteners for use on plaster, masonry, brick, concrete and stone walls, floors and ceilings . . . Location for installation and methods of drilling outlined . . . Necessary precautions, testing of toggles and limitations of various types of fastenings are covered

FROM TIME to time the plant maintenance man is faced with the problem of fastening something to a plaster, brick, concrete or stone wall, floor or ceiling. He may have a shelf to install or a workbench to build. The purpose of this article is to explain the different types of fastenings available and which ones he should use for the particular material at hand. It will also point out how these fastenings should be installed and errors to avoid in the work.

Since plaster is probably the easiest material to fasten to we will start with that. Plaster is supported in various ways, usually on wood laths, metal lath or directly on brick, concrete, tile or stone. But for our purpose we will consider only wood and wire lath since the other types of mounting require the same technique as though there were no plaster coating on the particular materials in question.

Fastenings in plaster are made with special bolts or screws called toggle bolts. As shown in Fig. 1, these bolts are installed by first drilling a hole carefully through the plaster and then passing the hinged or collapsible toggle of the bolt through this hole. As the toggle passes through the wall and reaches the other side it falls or expands across the hole, thus forming a threaded support on the other side of the wall into which the screw can be tightened.

Where the wall to be drilled is of wood lath construction, endeavor to locate the wood laths by tapping lightly upon the wall before drilling. And, if possible, drill the holes between the laths. This will result in an easier and stronger fastening.

If it is impossible to locate the wood laths in this manner, or if the hole position cannot be altered to suit the lath spacing, first drill the holes through the plaster with a masonry or star drill, and then drill through the laths with a regular wood or metal twist drill. Never try to drill through wood laths with a masonry or star drill since this is likely to split the laths and knock them loose from the plaster, resulting in a weakened and possibly cracked wall.

Where wire or expanded metal lath is supporting the plaster, simply drill the holes through the plaster with a star or masonry drill, and then carefully force the drill point through the meshes of the metal lath, so as to clear a path for the toggle to pass through.

When drilling plaster be sure to drill lightly and carefully, striking the drill with very light hammer blows. Rotate the drill a little after each blow. Heavy blows may cause the wall to crack before the drill passes through. Be sure to drill a hole exactly the right size for the toggle to pass through. A hole too small will cause difficulty in installing the toggle, and a hole drilled too large will not provide maximum support for the toggle.

Before installing a toggle bolt, be sure to try the toggle on the bolt to see if it spins free on the threads. The thread in the toggle or on the bolt may be burred or damaged, and this will cause trouble when you try to tighten the toggle bolt in the wall.

When using spring type toggles, be sure to try the spring arms of the

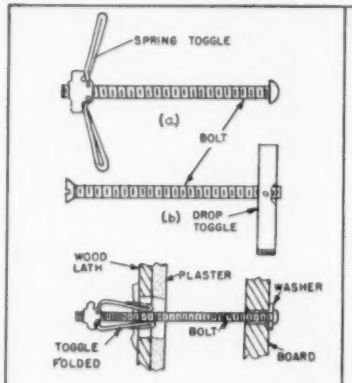


FIG. 1

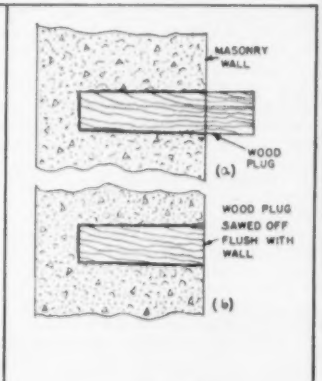


FIG. 2

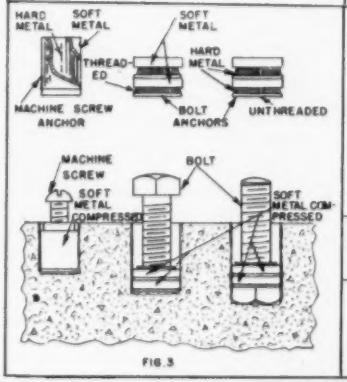


FIG. 3

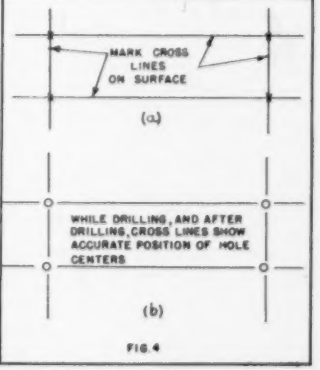


FIG. 4

Fig. 1. Two types of toggle bolts—spring and drop toggle. Fig. 2. Wood plugs should be used only for anchoring light objects which will exert a pull at 90 degrees from the long axis of the plug. Fig. 3. Two types of anchors—machine screw and bolt—and two methods of anchoring with the bolt anchor type. Fig. 4. Proper method of layout for locating center-lines of bolts. This is extremely necessary especially when using anchor bolts of the machine screw or bolt types

toggle to determine if they both will readily spring out into expanded position after the toggle passes through the wall. Any that will not work properly should be adjusted so that they will.

Thread the toggle on the bolt until about three or four threads of the bolt project through the toggle. When passing the toggle and bolt through the wall do not use hammer blows to force it through, as this is likely to strip or damage the threads in the toggle. If the holes have been drilled in the correct position and are of the proper size the toggles should pass through easily.

Tighten toggle bolts moderately. The toggle arms may be damaged or the threads stripped if they are tightened too much.

Brick and Concrete

Fastenings in brick, concrete and stone are made in several ways. As shown in Fig. 2, probably the easiest and simplest way is to use wood plugs. But this does not produce a very strong fastening and consequently should be used only where light loads are to be fastened to floors and low walls. They may be used under certain conditions in wall and ceiling fastenings, but only where the load is sidewise or 90 degrees to the long axis of the plug and where it is impossible for the plug to come out of the hole. Such an installation would be where a wood partition or wall studding was fastened to wood plugs in such a way that the studding would prevent the plugs coming out of the holes in the masonry.

This precaution is necessary since wood plugs usually shrink after a time and loosen.

Wood plugs should be made of hardwood, if possible, and should be slightly tapered. Their diameter should be at least three times the diameter of the wood screw or lag bolt used, and in no case less than one-half inch in diameter.

Drill the holes carefully with a star or masonry drill, using light to moderate hammer blows, and rotating the drill a partial revolution after each blow. When drilling in brick, concrete blocks or stone try to avoid drilling in seams. If this is impossible, use lighter hammer blows and extra caution to avoid jamming the drill or breaking out pieces of material.

Remove the drill frequently and clean out the masonry dust from the hole. If this is not done the drill may jam in the hole and be very difficult to remove.

The holes should be of such a diameter that the wood plugs will just enter about one-quarter inch, and their depth should be about one inch less than the length of the plugs.

Remove all dust from the holes and drive plugs in until they rest against the bottom of the holes. Be careful not to split or batter the plugs. Use a piece of hardwood between the hammer and the end of the plugs. When they have been driven tight and solid, carefully saw off the part projecting beyond the surface of the wall with a compass saw or hack saw blade. The use of a regular carpenter's hand saw is not advisable because of the danger of damaging the sides of the teeth on projecting surfaces of the wall.

The screw centers should then be measured and marked on the plugs and a hole drilled for each. The hole diameter should be approximately one-half the diameter of the screw to be used.

There are plastic plugs on the market, so constructed that when a screw is inserted and tightened, the plugs will expand and grip the sides of the hole.

A stronger fastening for use in masonry materials is shown in Fig. 3. This type anchor is made in two styles. One is for use with machine screws and the other for use where bolts are to be employed.

In using this type anchor, in the machine screw pattern, a hole is drilled to a depth equal to the length of the anchor. The diameter of the hole should be such as to provide a snug fit for the anchor. If it is too small the anchor will not set firmly all the way to the bottom, if it is too large the anchor will not expand tightly against the walls of the hole.

Soft Metal Sleeves

After the hole has been drilled and the dust removed, place the anchor in position, as shown, with the cone end toward the bottom of the hole. Then, using the special setting tool provided, drive the soft metal sleeve down on the hard metal tapered nut. This will expand the soft metal sleeve and cause it to tightly fill the space between the tapered nut and the sides of the hole, securing the tapered nut solidly in position. Drive the sleeve with only moderate hammer blows. Do not drive too hard or too far as this may destroy the metal. It is now ready for use with a machine screw as a fastening. The screw length should be such that when fully tightened it will not reach the bottom of the threaded hole in the anchor.

The bolt pattern anchors of this type are installed in a somewhat different manner. As shown, they come in two styles. One is used in the same way as the machine screw anchor just described—as a threaded anchor for bolts. The other style has no threads. It is designed for the purpose of anchoring a bolt in a hole, head downward, so that the bolt can be used as a threaded stud.

The threaded anchor style is installed as follows: The first or threaded hard metal insert is placed in the previously drilled hole, as shown, and the threaded guide tool furnished is threaded into this insert. Then a soft metal ring is placed over the guide and allowed to come to rest on the tapered top of the threaded insert. This ring must be inserted with tapered side toward the threaded insert. A short length of proper size iron pipe is then used to expand the soft metal ring against the sides of the hole. Medium hammer blows are sufficient.

Now remove the setting tool (length of pipe) and place another hard metal ring (unthreaded) on top of the expanded soft metal sleeve, adding another soft metal sleeve on top of this. See that the tapered side of the hard metal sleeve is toward the open end of the hole, and that the tapered side of the soft metal sleeve faces the bottom of the hole. Use the setting tool again to expand this second soft metal ring.

The size of the bolt and the holding power desired will determine how many sets of hard and soft metal rings to use. These directions may be found on the box in which the anchors are sold. But in general two sets, as described, are usually sufficient for the smaller sizes of bolts.

When the guide tool is removed the anchor is ready for use with a machine bolt. Use one whose length is such as to prevent its bottoming in the hole.

The second style of anchor is installed as follows: Place the bolt to be anchored in the hole, head downward. Then place a hard metal threadless ring (tapered side away from the bottom of the hole) into place on the bolt. Place a soft metal sleeve (tapered side toward the bottom of the hole) on top of this. Use the setting tool to expand the soft metal ring in the same manner as previously described. The bolt itself serves as a guide in this case. Use as many sets of rings as desired, following the same procedure as for the threaded anchor.

Alinement

In mounting any object with toggle bolts, wood plugs or machine screw or bolt anchors, a good layout plan to follow is the one shown in Fig. 4. This will enable you to be able at all times to check alignment. This is especially important when drilling holes, for, unless the position of the hole is checked frequently, the drill is liable to wander, with the result that the hole will be inaccurately positioned. This precaution is very important when installing machine screw or bolt anchors since these often must line up exactly.

It is a good idea to use lock washers wherever possible on screws and bolts of fastenings. They will exert a constant tension, thus helping to prevent loosening of the fastening.

ELECTRICAL MODERNIZATION CALLS FOR INGENUITY

By WILBUR J. FLEIG
Consulting Engineer

Changing a large department store over from a-c to d-c called for resourcefulness and ingenuity . . . Columns of conduits, over 200 ft in height, had to go in and be self-supporting . . Space was limited but the job was done . . . Lifting transformers caused trouble, too

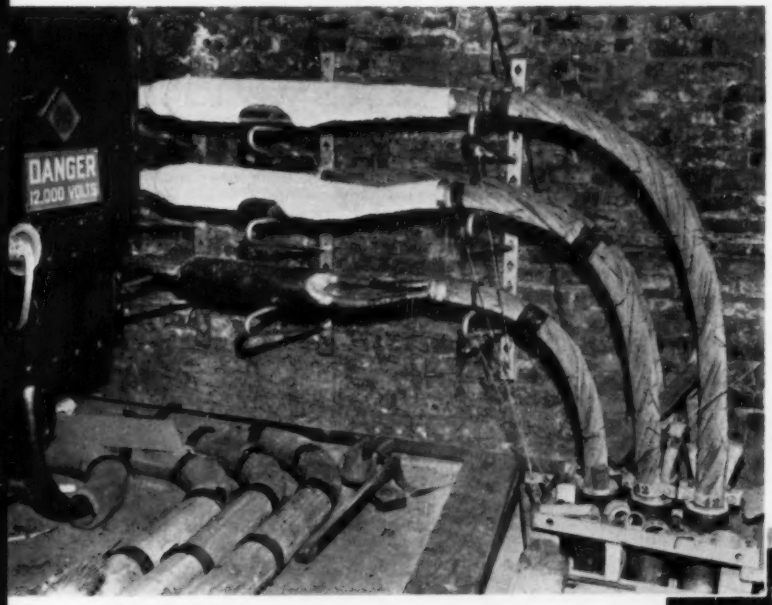
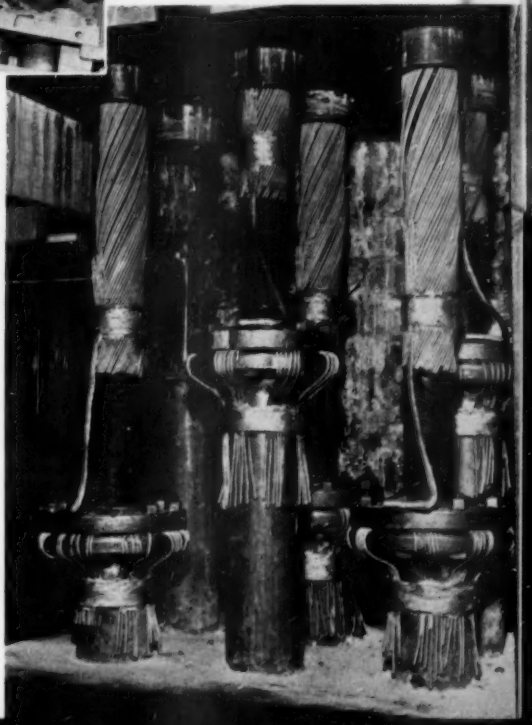


Fig. 1. Terminal splices of the 12,000-v cable in the transformer vault on the 15th floor level. Transformers were located in penthouse largely because of the excellent ventilation obtainable without the use of fans. On the 14th floor, the main switchboard was installed

Fig. 2. Below: This view of the column housing the six 4-in. steel conduits was taken on the 13th floor. The cables were over 200 ft in height and were located in a 22 in. by 26 in. rectangular concrete column. This structure had to be self-supporting, vertically, and the base also had to be capable of sustaining the entire weight. Lateral supports were secured to the building structural columns adjacent to the feeder column



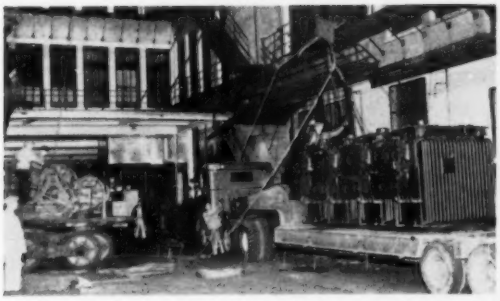


Fig. 3. Above: Another major problem encountered in the department store modernization job was that of hoisting the transformers from the street level up to the vault at the 15th floor level. This photo, taken at street level, shows the hoisting machinery and the rigging in place. "A" frames constructed of 12 ft by 12 ft timbers were erected on the roof and supporting guys were fastened to other parts of the building. When the transformers arrived at the 15th floor they were pulled manually into the vault with block and tackle. From that point they were pushed on pipe rollers into position. Each unit weighed approximately 14,000 lb without network protector. Because of careful pre-planning, the trip from street level to the 15th floor took approximately 3 minutes

(Continued from page 28)

A noted architectural consultant recently stated that thin-walled construction permitted a saving in space amounting to as much as ½ sq ft per lineal foot of exterior wall. He contended, for example, that if Rockefeller Plaza in New York had used thin curtain walls, a total of 112,490 sq ft could have been devoted to additional revenue. At the current price of $4.00 per square foot this bonus space would have amounted to $450,000 additional revenue annually.

Aluminum curtain walls, by means of integrally cast lugs on each panel, are hung on the building's structural frame from within, eliminating the use of derricks, scaffolding and rigging. Since pre-cast aluminum panels are delivered to the building site ready for installation, erection is rapid, permitting several crews to work simultaneously in relatively restricted areas.

Tile on Floor Helps Air Compressor Room

Contributed by Hercules Motors Corp.

NOT TOO LONG ago one of the main sources of trouble and worry for our maintenance department was the floor in our air compressor room. The concrete was continually dusting and creating dirt and permitting the seepage and staining by oil.

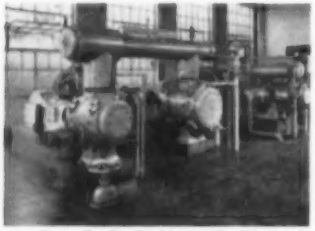


Photo: The Tile Tex Division, The Flintkote Co.

Tile floor in Hercules Motors' air compressor room has bettered working conditions, reduced maintenance costs and improved appearance of the room

Some time ago we got the idea of installing a grease-proof tile on this particular section of floor. It has stood up well, as shown in the photograph and, furthermore, has reduced maintenance and enhanced the appearance of the room.

Applying Industrial Control To Save Work and Steps

Contributed by Howard T. Boiley

IN THIS DAY OF highly mechanized and instrumentized industry it has become important that supervisors in charge of electrical and machine maintenance keep abreast of the latest developments in control circuits and their application in the plant.

Practically all modern equipment comes outfitted with the latest in safety devices that greatly improve the efficiency of their operation. But even with the high degree of engineering involved in their design there still remains ways and means of improving the simplicity of their operation.

Two such control applications which I, as Maintenance Engineer, have found useful in our heating boiler installation are described

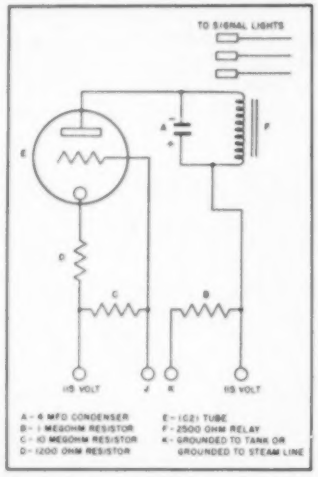


Fig. 1. Here are the elements of the electronic switch applied by Mr. Bailey to the solution of two different problems

here. Both controls are simple in design and have more than paid for their cost by improving the efficiency and ease of boiler operation and maintenance. We installed a 300 hp low pressure boiler which burned fuel oil supplied from two 8000 gal underground tanks holding No. 6 fuel oil. Control system was automatic.

With no boiler attendant this setup necessitated numerous trips to the boiler room to check oil level and to determine if the burners were still operating properly. It soon became apparent that some easier way of doing the job was imperative. I decided there were two things we must have: One, a signal light at my desk to show when the boiler pressure fell below the cutting-in pressure. This would give us an opportunity to get the burners into operation before the offices began cooling down. Second, there must be a similar signal to show when fuel oil level was at a dangerous point. One time we ran out of oil and the results were embarrassing.

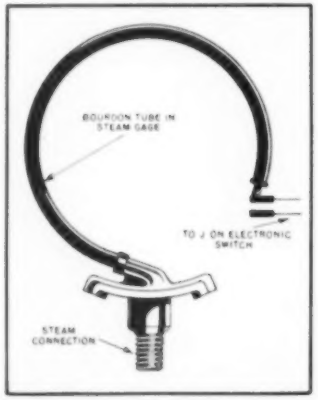


Fig. 2. Diagrammatic sketch of the indicator which warns of low pressure steam and approaching cold office space

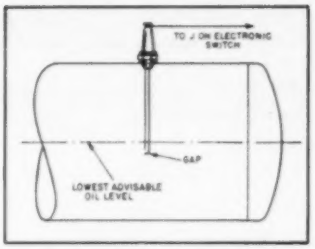


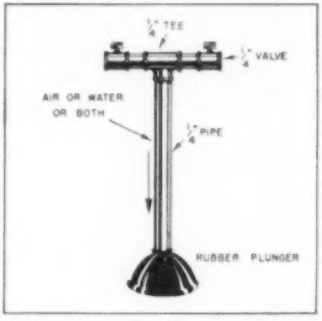
Fig. 3. Oil level indicator. A ¼ in. round rod mounted in the opening of the tank. This can be a large spark plug with a long extension brazed to the electrode so that the lower end of the rod is located at the lowest point oil level should be allowed to reach. There is sufficient conductivity in the oil to hold the relay in; when oil level drops below the tip of the rod the relay will open thus closing signal contacts

Both of these controls were rigged up as shown in the sketches utilizing electronic switches.

Air Plunger Opens Stubborn Drains

Contributed by Donald Sametz, Allis-Chalmers Mfg. Co.

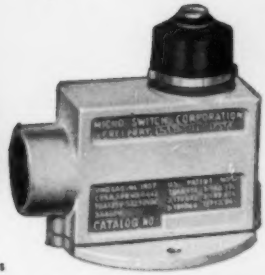
AN AIR PLUNGER, utilizing an ordinary rubber suction cup and other spare parts, was devised by the author for opening stubborn sink, basin or toilet drains.



Drain-opening plunger made of spare pipe nipples, air valves and miscellaneous material found around every plant

The plunger, which is made to fit all holes, can be hooked up to hot water or air, or both, and has proven very successful.

MICRO PRECISION SWITCHES for Production Short Cuts



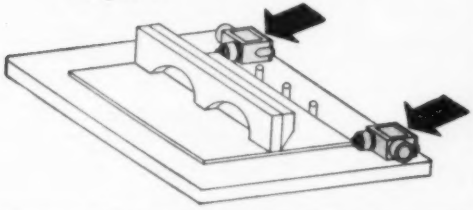
MICRO . . . First name in precision switches

Plant electricians and factory maintenance men are continually finding new ways to use MICRO precision switches to reduce accidents to personnel and equipment, eliminate waste of materials, increase accuracy of fabrication, save man-hours and increase production.

The typical plant applications shown here are the "real McCoy." They are production short cuts that have proved themselves in actual operation. Would you like to receive "MICRO TIPS" which contains still other practical applications? Write us today.

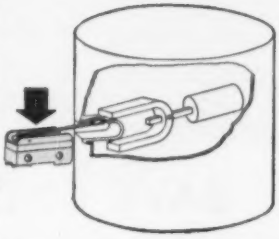
1 MICRO Precision Switches Properly Position Sheet Stock in Shearing Press

Two MICRO precision switches at each end of shear gage bar are wired in series to solenoid-operated safety under the shear pedal. Stock must enter shear evenly, with both ends depressing the switches, before the pedal can be operated.



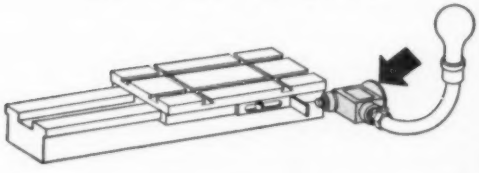
2 MICRO Precision Switch Operates Controls for High Pressure Hydraulic System.

Variations in level of the float alters position of magnet which operates switch with minimum amount of travel and has no spring return. This provides water-level control without mechanical linkage. Switches are used to indicate high water, sound an alarm, shut off pumping system and actuate an annunciator drop.



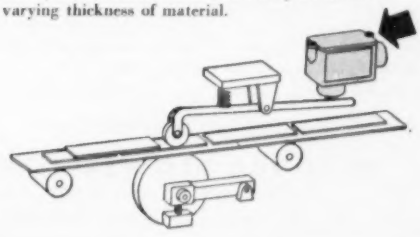
3 MICRO Precision Switch Stops Hobbing Machine and Operates Signal Lamp.

Switch, mounted on hobbing machine, is actuated by a piece of metal mounted on the carriage. When the cut is finished, the metal strip actuates the switch which stops the machine and closes a circuit to a red signal lamp.



4 MICRO Precision Switch Checks Parts for Double Thickness.

Switch is mounted on conveyor feeding steel parts to signal operator and stop the conveyor should there be a double thickness of parts on the conveyor. The mechanism is made adjustable to varying thickness of material.



MICRO SWITCH Distributors with complete stocks are located in ninety-nine cities to supply you with just the right switch to make your plant operations more automatic. Look for them under "Switches, Electric" in your classified phone book.

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• Niagara Aero Heat Exchangers provide faster and more accurate cooling to specified temperatures for liquids in many industrial processes. They help lower production costs.

Cooling by the evaporative principle, they transfer heat to air, which is easily disposed of, and consume less than 5% of water used in conventional cooling methods. A Niagara Aero Heat Exchanger replaces both shell-and-tube cooler and cooling tower, and saves piping and pumping. Its savings quickly return its cost.

It helps improve the quality of production by removing heat at the rate of in-put, and by greater accuracy of control. For example, as applied to heat-treat quenching or to a chemical process cooling, provision for heating as well as cooling saves the time and prevents the product losses of a "warm-up" period.

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Write for Bulletin No. 96

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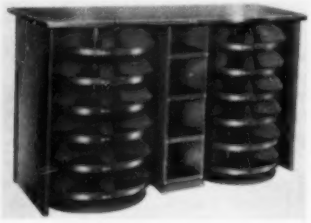
1—COUNTER BIN

Gives you more storage room by using space under counters

The new Rotabin Counter provides aisle access to 72 large compartments in twelve 28-in. dia independently rotating trays. What's more, four stationary spaces are available for large items.

The steel counter is built to take hard usage. Its top is a single heavy gage sheet, and center shelf section is



bolted in place. The two Rotabin units are each supported on a heavy gage formed base. Over-all dimensions are 6 ft 3¼ in. long by 27 in. deep by 41⅝ in. high. Finish is olive green enamel, baked on. The Frick-Gallagher Mfg. Co.

2—TOOL CARRIER

Is time-saver and step-saver in tool room, on assembly lines

Latest of company's Hallowell shop equipment line is the sturdy, easy-rolling Carry-Tool. It's made of heavy gage steel and has large drawers that hold a full complement of tools. Ball-bearing rollers make the drawers slide easily, loaded or empty, and padlock attachments protect drawer contents. Standard Pressed Steel Co.

3—SPLASH-PROOF MOTORS

For constant speed applications both indoors and outdoors

These squirrel cage motors are protected from dripping or splashing liquids by solid rolled-steel frames and baffles in the end brackets. They're recent additions to company's series of CSP Life-Line induction motors, and have prelubricated bearings.

They are suggested for use in food processing plants, chemical plants, boiler rooms, laundries, refineries wherever splashing liquids are encountered. Available in NEMA standard dimensions, frames 364 through 445; 7½ to 100 hp; 60, 50 and 25 cycles; 208, 220, 440, 550 and 2300 v. Westinghouse Electric Corp.

4—STOCK MODEL CONVEYOR

Is available with several types of beds, all interchangeable

By assembling stock parts and units to your specifications, the manufacturer of Flo-table Belt Conveyors helps you cut costs on horizontal and floor-to-floor conveyor installations. Slide, roller, line roll and troughing types are available

C-O-TWO

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C-O-TWO now adds another outstanding contribution to modern fire fighting . . . C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing Systems. Carbon dioxide stored in bulk under low pressure, means greater fire protection for your larger size fire hazards at less cost.

Flexibility is the keynote of these new type C-O-TWO Fire Extinguishing Systems . . . the low pressure carbon dioxide storage tanks range in capacities from one to fifty tons, and can be operated as straight manual, partially automatic or fully automatic systems.

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R & M HOISTS deliver

Nine R & M hoists give super service in scorching temperatures on the pouring floor of a foundry in Ironton. Every day these hoists move from 350 to 400 tons of molten metal from furnace to flask. A special bearing is used in the block because of the sizzling heat. In photo, note low headroom required. This is characteristic of R & M hoists. Every day these hoists meet the grueling requirements of this foundry and thousands of other plants. They up production, lower unit costs, increase profits.

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From the new "J" hoist, with its ¼-ton capacity, to 25-ton cranes, R & M manufactures a wide range of versatile handling equipment for the toughest work. If it's a job for a hoist, crane or winch . . . Take it UP with R & M.

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Capacities From
250 to 20,000 lbs.

WRITE OR WIRE FOR DETAILS

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and a different bed can be inserted when required.

Sixteen standard belt widths from 6 to 36 in., and standard lengths to over 100 ft (10 to 100 lb capacity per foot) are available. Can be floor mounted at 18 to 37-in. height, or ceiling suspended. Units are made of smooth, pressed steel, and drive and take-up are enclosed. Accessories can also be ordered from stock. Mar-rail Conveyor Co.

5—INSTRUMENT TUBING

For use in laboratories, chemical and food plants, refineries

Dekoron is a low-cost metal tubing with a $\frac{1}{32}$-in., tight-fitting coating of extruded thermoplastic to protect it against corrosion. Since the plastic is immune to moisture, salt air, oils, acids and alkalis, this tubing is well adapted for use wherever corrosive atmospheres are found.

The coating, which also serves as color coding for the line, is described as chip-proof and flexible—tubing can be bent easily. It's available in ¼ and ⅜ in. dia. Your request for information about Dekoron will also bring you some sample lengths of it. Samuel Moore & Co.

6—FLYING SAUCER CASTER

For racks and dollies requiring low height and fast swiveling

There's a logical explanation for this flying saucer—caster, that is. Its wheel, instead of being rounded to tread vertically, is saucer shaped and turns at an extreme angle to make it roll easily over bumps and across rough floors.

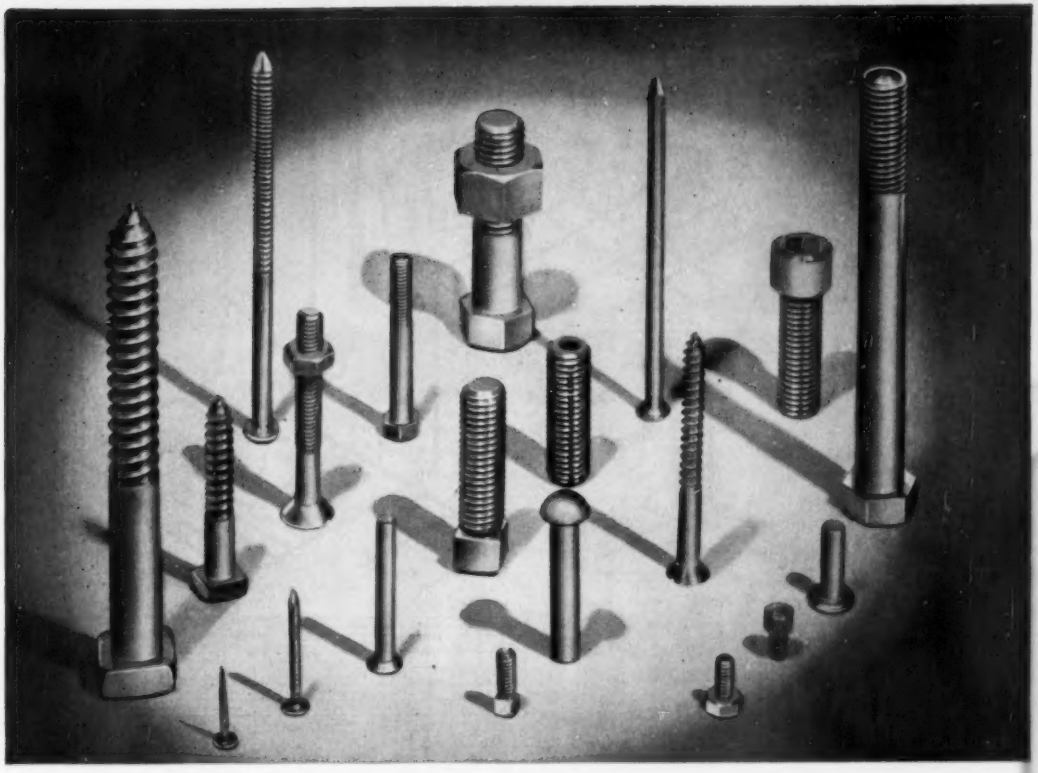
These casters are 3⅞ in. high and meant to be used on fairly light equipment. Plate and saucer are heavy gage steel; saucer wheel is case hardened. The Bassick Co.

7—DIAPHRAGM VALVES

For controlling the flow of steam, water, oil or gases

Flowrite Valves are air or water- operated for pressures below 250 psi, and come in sizes from ¼ to 8 in. A variety of stainless steel or bronze valve bodies are available in the line—single or double seat, double unions and flanged ends, direct and reverse acting and three-way types.

Bonnet assembly incorporates a stainless steel stem in preformed lubricated metallic packing. Housing and top are cast iron. Among features stressed are the molded Neoprene diaphragm with positive sealing bead, and piston plate assembly with free floating thrust plate to absorb side thrust. The ball bearing non-rising adjusting screw has a 180 deg turning radius with starting pressure adjustable from 0 to 17 psi and enclosed steel spring for full travel in 5 or 10 psi control pressure change. The Powers Regulator Co.



20 Ways To Stop Trouble Before It Starts!

How A Textile Company Put Monel Fastenings To Work

Problem: Piece goods, dripping with a sulfuric acid solution, were being transported in wooden carts. Maintenance of the carts was a constant chore, because the acid attacked the nails holding them together. Continual moisture also weakened the nails' grip, causing them to "back out."

Solution: Both problems were ended by using the Monel fastening shown at left (Monel "Anchorfast" nail, made by Independent Nail and Packing Co., Bridgewater, Mass.). The Monel nails remained unaffected by the acid; the annular grooves around their shanks made them hold like screws.

WE WANT TO HEAR ABOUT YOUR TOUGHEST FASTENING PROBLEM. WE THINK WE HAVE THE ANSWER IN MONEL

For most jobs ordinary fastenings are adequate.

But there are plenty of jobs where you need extra protection against rust... corrosion... shock... overstressing... vibration... heat... cold.

For those jobs you need the protection of *Monel*®.

Just look at the "extras" you get from Monel fastenings.

They resist corrosion by caustics, most acids, salt water. They're 100% rustproof.

Even their mechanical properties are superior. For, compared to the free-cutting steel used in ordinary fastenings, Monel is 20% stronger ...30% more ductile...40% tougher.

And if extreme temperatures must be endured, you'll find Monel fastenings safe at high heat or sub-zero cold.

How many places in your plant or product do you want (*and need*) the extra advantages of Monel fastenings? Remember, *any* fastening you need is available in longer-lasting Monel.

TEST A MONEL FASTENING, FREE! Write to Bob Johnson of Inco. Tell him the type and size you need. He'll send a sample... plus the address of your nearest supplier.

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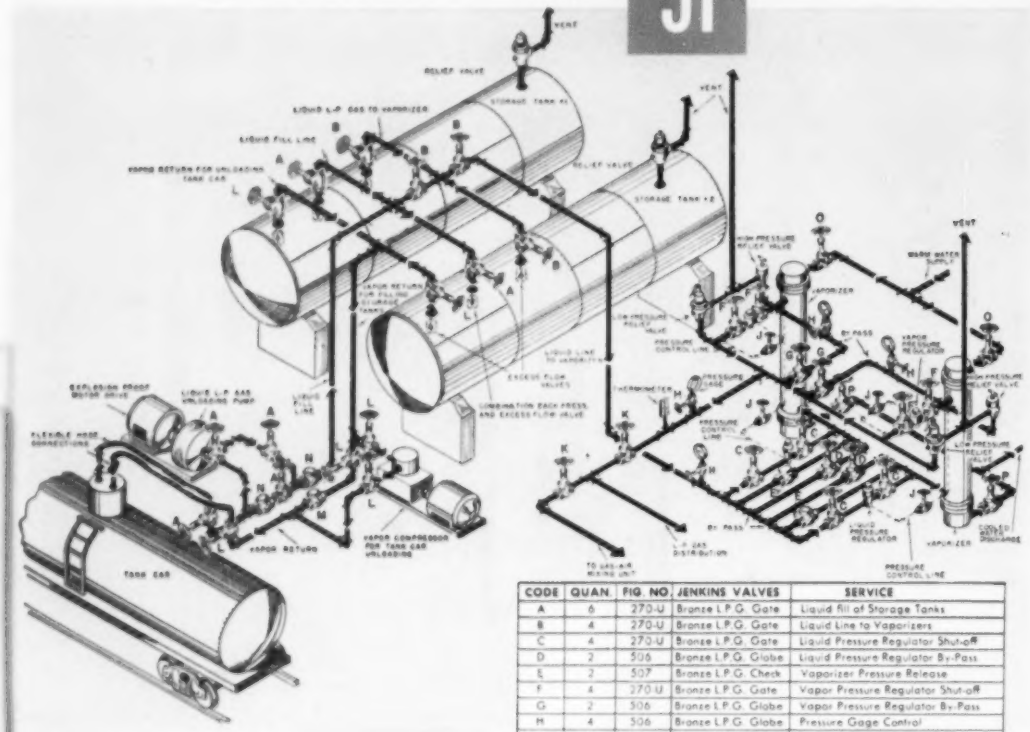
*Reg. U. S. Pat. Off.

JENKINS PRACTICAL PIPING LAYOUTS 51



CODE	QUAN.	FIG. NO.	JENKINS VALVES	SERVICE
A	6	270-U	Bronze L.P.G. Gate	Liquid fill of Storage Tanks
B	4	270-U	Bronze L.P.G. Gate	Liquid Line to Vaporizers
C	4	270-U	Bronze L.P.G. Gate	Liquid Pressure Regulator Shut-off
D	2	506	Bronze L.P.G. Globe	Liquid Pressure Regulator By-Pass
E	2	507	Bronze L.P.G. Check	Vaporizer Pressure Release
F	4	270-U	Bronze L.P.G. Gate	Vapor Pressure Regulator Shut-off
G	2	506	Bronze L.P.G. Globe	Vapor Pressure Regulator By-Pass
H	4	506	Bronze L.P.G. Globe	Pressure Gage Control
J	4	506	Bronze L.P.G. Globe	Pressure Control Line Shut-off
K	2	270-U	Bronze L.P.G. Gate	Distribution System Shut-off
L	6	270-U	Bronze L.P.G. Gate	Vapor Return for Tank Car
M	1	507	Bronze L.P.G. Check	Prevent Vapor Backflow
N	2	507	Bronze L.P.G. Check	Prevent Liquid Backflow
O	2	47	Bronze Gate	Warm Water Supply
P	2	106 A	Bronze Globe	Cool Water Discharge

How to plan a
STORAGE AND VAPORIZER HOOKUP FOR LIQUEFIED PETROLEUM GAS

PETROLEUM GAS, (propane, butane, etc.) liquefied at atmospheric temperatures by moderate pressures, is shipped by tank car to local storage plants. Diagram shows piping and equipment used in vaporizing and storing these gases.

THE LIQUEFIED GAS is unloaded into storage tanks with the use of liquid pump and vapor compressor. The compressor draws vapor from the tank and returns it to the tank car at a slightly higher pressure, forcing out the remaining liquid. This passes through a regulating valve, to the vaporizer where steam or hot water heating converts it to vapor.

THIS GASEOUS FUEL is then piped through a pressure regulator which assures a constant pressure, and on to the gas distribution system or gas-air mix unit. Duplicate vaporizers provide continuous service in case of breakdown. Safety relief valves are vented to the atmosphere. Check valve on vaporizer inlet acts as a relief valve when vaporizer pressure exceeds that of tank.

Consultation with accredited piping engineers and contractors is recommended when planning major piping installations.

A CHOICE OF OVER 500 VALVES

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering, select all the valves you need from the Jenkins Catalog. It's your best assurance of *lowest cost in the long run*.

Jenkins Bros., 100 Park Avenue, New York 17; Jenkins Bros., Ltd., Montreal.

NEW BOOK OF PIPING LAYOUTS, Nos. 26 to 50
A new book of Jenkins Practical Piping Layouts — Nos. 26 to 50 — including above, is in preparation. Mail coupon to get your copy when ready.

JENKINS BROS., 100 Park Ave., New York 17, N.Y.
Reserve copy of New Piping Layout Book for

Name _____

Company _____

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JENKINS
LOOK FOR THE DIAMOND MARK
VALVES SINCE 1864
TRADE JENKINS MARK

8—TUBING STAPLES

Are made with a steel core for strength, and copper surface

Readily available and low priced, Tube-Tite Staples provide a neat, quick fastening for the copper or brass tubing used in radiant heating lines and in hot and cold service lines. Their surface is

copper to prevent galvanic action between staple and tubing. In sizes to fit ⅜, ½ or ¾ in. nominal tubing, the two smaller sizes are made of flat wire and the larger of rounded wire. Packaged in cartons of 100 and 500. E. H. Titchener & Co.

9—ENCLOSED MOTORS

In 5 to 250 hp ratings, are fan cooled, have cast iron frames

These totally enclosed motors can be had in both standard and explosion-proof types. They're described as especially suitable for use in chemical plants, refineries and other industries where corrosion is a problem—either because of the kind of materials processed or because the motors have to be installed outdoors.

Built with cast iron frame, endplates, blower shield and cast aluminum rotor, these motors are given both an insulating varnish treatment and heavy coating of a special acid and alkali resisting varnish. Wagner Electric Corp.

10—MAINTENANCE UNIT

Is small sized, can be converted into several power tools

In 18 by 60 in. of floor space the Shopsmith gives you a power maintenance unit that's convertible into an 8-in. circular saw with extension table, 15-in. vertical drill press, 33-in. lathe, 12-in. disc sander, or horizontal drill press.

The horizontal drill press is a new tool for doweling, drilling in the ends of long workpieces and other jobs that are difficult or impossible on a vertical press. With available accessories the Shopsmith can also serve as jointer, shaper, drum sander, mortiser, jigsaw, and other power tools. Magna Engineering Corp.

11—CHEMICAL CLEANER

Cleans steel, takes off fluxes, heat scale, surface corrosion

Formula 73, developed during the war for pre-cleaning and post-cleaning of welding and silver brazing, can also be used as a flux and is now being used for preparation of sweat fittings on copper and brass tubing.

It takes rust right off, according to manufacturer, and it's non-inflammable, and non-toxic. Just sponge it on, rub with steel wool or cloth, then wipe with clean cloth. Sully Engineering Ltd.

12—ECONOMICAL PUMP

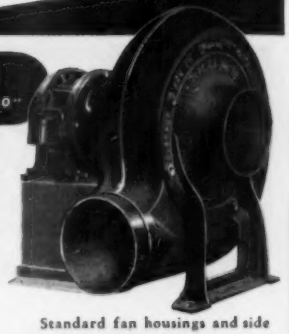
Is especially designed for standardized quantity production

Newest of company's IMO line is the Series A313A. Its reduced cost is ex-

Good Horse Sense . . . to Use These **HEAVY-DUTY CLARAGE FANS**

TYPE CI EXHAUSTERS

Capacities to 4000 CFM; Pressures to 20"



Nothing shoddy or flimsy about these smaller Clarage industrial fans. They are O.K. for continuous service — built to the *same exacting standards* as the largest Clarage equipment.

Try them! . . . then you will readily understand why we call them "HEAVY-DUTY" — *and mean just that!*

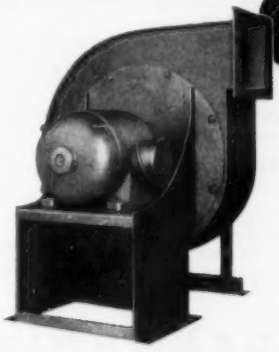
Use Clarage Type CI Exhausters for removing excess heat, dust, smoke, odors from any manufacturing operation — for supplying air to oil burners, as over-fire fans, etc. Use them for pneumatic conveying.

Fans also can be furnished gas tight, rubber covered, or with vulnerable parts of stainless steel or Monel — in fact, *in any construction* your special needs demand.

Standard fan housings and side plates are cast iron, long wearing, long resisting to corrosion. Heavy steel plate wheels are perfectly balanced. Fans in each of the 6 sizes can be V-belt or direct motor driven.

TYPE O BLOWERS

Capacities to 30,000 CFM; Pressures to 35"



Another Clarage HEAVY-DUTY industrial fan! Use Type O Blowers for *high pressure* applications — supplying air to cupolas, gas and oil burners, etc. Fan housings and wheels are heavy steel plate equal to severest conditions. Built in 19 sizes, operating at speeds *most economical* for direct motor or steam turbine drive.

WE ALSO MAKE:

LARGE INDUSTRIAL FANS
AIR CONDITIONING EQUIPMENT
AIR WASHERS UNIT HEATERS

CLARAGE FAN COMPANY - *Kalamazoo, Michigan*

CLARAGE

—HEADQUARTERS for Air Handling and Conditioning Equipment

SEE OUR CATALOG IN SWEET'S

It pays to direct fan inquiries our way . . . phone Clarage office in your city, or write us at Kalamazoo.

Application Engineering Offices in All Principal Cities

RAM COSTS DOWN with Ramset Fastening System

Quicker than lightning, the self-contained RAMSET TOOL instantly sets drive pins or threaded studs through steel or wood, into steel, concrete, masonry, other hard materials. Slashes costs and time up to 80% for such fastening jobs. Takes less than a minute from start to finish—faster than you can load and light your pipe! Here's why:

1. **No drilling, chipping, plugging, tapping.**
2. **Insert RAMSET FASTENER into tool, with power charge.**
3. **Place against work spot. Then RAM! The fastener sets, instantly, tightly.**
4. **No make-ready or clean-up work. No muss, no fuss, no dirt.**
5. **Light, compact RAMSET TOOL needs no external power. It's completely self-contained.**
6. **No hauling heavy equipment. RAMSET TOOL can be carried in one hand and used in tight, confined spaces.**
7. **Small first cost, pays for itself quickly—and it's savings and profit from then on!**

Every day, thousands of users prove the value of RAMSET SYSTEM . . . the pioneer in powder-actuated fastening methods. A 15-minute demonstration will prove its cost-reducing, time-saving values. Call your local RAMSET Specialist or use coupon for complete details.

STEMCO CORPORATION

12117 Berea Road • Cleveland 11, Ohio

ASK FOR DEMONSTRATION AND DETAILS!

Stemco Corporation, 12117 Berea Road, Cleveland 11, Ohio PE

Please send further information on cost-cutting, time-saving value of RAMSET FASTENING SYSTEM.

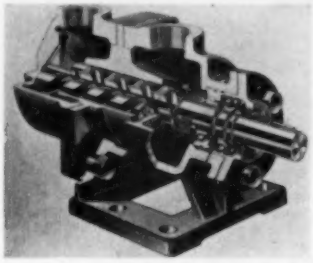
Name _____ Title _____

Company _____

Kind of business _____

Address _____

pected to extend IMO advantages of many applications requiring a reliable, quiet, pulsation-free, high-speed pump. It's intended for pumping petroleum products and other light or viscous fluids in volumes of 85 gpm against pressures to 150 psi, as required for rotary and steam atomizing oil burners, oil transfer, lubrication hydraulic systems.



As in other IMO pumps, the A313A's only working parts are a power rotor and pair of sealing or idler rotors. This pump can be direct-connected to electric motors, turbines or other high speed drivers. Parts are interchangeable and pump can be mounted in any position. DeLaval Steam Turbine Co.

13—STACKING RACK

For storing wire and like materials where headroom is limited

Handy space-saving stacking by lift truck or crane operation and safe tiering, are offered by these stacking racks. Of welded, all-steel construction, they have corrugated bottom, I-beam ends and a safety interlocking feature to prevent shifting and keep tiered racks in place. Manufacturer will build racks in sizes to meet plant requirements, paint them in color specified. The Palmer-Shile Co.

14—CLUTCH PULLEY

Is variable speed device controlled by engine speed

This automatic variable speed clutch pulley is designed to permit infinite gear ratio changes on any kind of machinery on which a variable speed belt can be used. The clutch itself is centrifugally operated and allows for independent action of the pulley belt by means of an intermediate ball bearing. This is set on the pulley shaft; the belt rides on it when engine speed is reduced and the pulley is in an idling position. With acceleration, the pulley belt is picked up by the pulley with no wear on the belt. The starting load is thus picked up gradually without strain.

Ratios can be increased or reduced, depending on belt width used. The horsepower capacity of the clutch is limited only by the belt capacity. The clutch is described as simple and safe. Among the many advantages heralded for it are the prevention of starting overload and the elimination of wear on belts when the clutch is in an idling position. The Driv-Way Lite Co.

15—CURRENT LIMITER

Protects electrical installations against short circuit damage

The Amp-trap is a current limiting device for use with low voltage switchgear, bus ways, circuit breakers, transformers. By combining high current

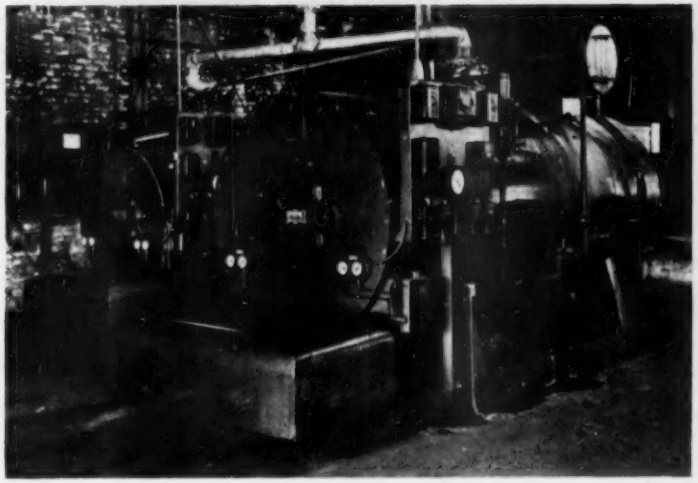
SAVE *better than a $1000 a month*

SAVE LABOR — SAVE FUEL — SAVE COSTLY MAINTENANCE

Actual case histories of two Steam-Pak installations at the Monon Railroad, Indianapolis and Lafayette.

HOW MUCH CAN YOU SAVE BY INSTALLING A STEAM-PAK YORK POWER GENERATOR

Buildings at Monon Railroad Roundhouse requiring steam from the York-Shipley boiler illustrated at right.



Monon Railroad has made labor savings of more than $1,000 per month on the York-Shipley self-contained Steam-Pak boiler units at Indianapolis and Lafayette, Indiana. Pictures above show installation at Indianapolis.

Steam-Pak Generators are built in capacities from 15 H.P. up, for low or high pressure steam or hot water, for light or heavy oil, combination gas and oil, or straight gas.

Can you save money with a Steam-Pak? There is one way to find out . . . ask a Qualified Heating Engineer. Your York-Shipley Distributors are thoroughly qualified to analyze your problem and determine savings. See your nearest York-Shipley Distributor or write, wire or 'phone

YORK-SHIPLEY

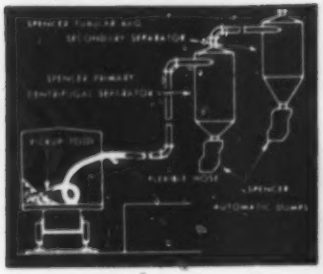
INDUSTRIAL DIVISION

822 Jessop Place, York, Pennsylvania — 'Phone 7861

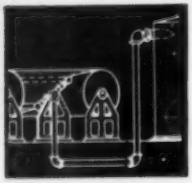
Gas and Oil Steam-Pak Generators | Gas and Oil Vertical Boilers | Rotary Industrial Oil Burners | Oil-Fired Conversion Burners | Gas-Fired Conversion Burners | Oil and Gas Water Heaters | Oil and Gas Winter Air Conditioners | Oil and Gas Tubeless Boiler Units

YORK POWER INDUSTRIAL DIVISION — YORK AIRHEAT RESIDENTIAL DIVISION

Write For Case Histories on How Others Save Money



Lint is removed from finished hats and liner cloth, hats are cleaned, and freight cars are loaded, unloaded, and cleaned.



Freight Cars, Hats and Textiles

...WITH SPENCER VACUUM

Vacuum, the new tool for industry is handling raw materials by the ton, performing dozens of operations automatically on the production line, and removing lint, dust, and other materials, just before packing and shipping.

A few of the unusual applications are illustrated above, but the real progress comes when plant engineers understand the fundamental functions of vacuum and apply them to their specific manufacturing problems.

For instance, excess powdered sugar is removed from candy on a conveyor line. Almonds are set into the tops of cakes, bags are deflated, valuable metals reclaimed, and moisture removed from wet cloth—all with Spencer Vacuum and all explained in the new Spencer Bulletin—yours for the asking.

356-E

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER
HARTFORD

interrupting ability with fast action, the Amp-trap cuts off the current before it can build up to dangerous levels.

Amp-traps come in models and ratings to match electrical characteristics of old and new power installations. They're said to have high interrupting capacity regardless of their current carrying capacity—because they are directly responsive to rate of rise of short circuit currents, their speed of action automatically matches the circuit requirements. The Chase Shawmut Co.

16—DIAMOND WHEELS

Come in sizes $\frac{3}{64}$ in. and up, mounted or unmounted

The use of highly concentrated diamond powder with a tough metal bond has resulted in these diamond wheels for use on steel, carbides, glass, ceramics and hard alloys. Manufacturer says these wheels cut fast, hold their shape and last a long time.

You can use these wheels in portable lathes, milling machines, drill presses, jig grinders and the like for grinding dies of all types, internal grinding, sharpening small acorn dies, enlarging key ways. Starlite Industries Inc.

17—PIPELINE MAGNET

Is complete package, including Alnico magnet and adaptor

This recently designed separator removes tramp iron from material flowing in round pipe installations. An adaptor is provided to make installation easy.

To install the magnet in a pipeline, just cut out a small section of the pipe where protection is needed. At the inlet side, the adaptor fits over the outside diameter of the pipe. At the outlet side it fits inside the pipe. Material being cleaned passes right over the face plate of the magnet. Eriez Mfg. Co.

18—WIRE ROPE SLING

Is flat braided, custom made to length, capacity requirements

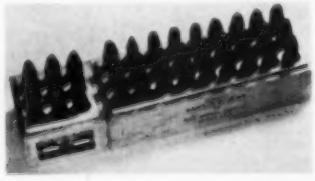
Here's a sling designed for lifting jobs demanding a sling with wide, flat bearing surface and minimum thickness in addition to light weight and flexibility. It's used in a basket hitch with the sling encircling the load and the two loop eyes on the crane hook.

Designated the Drew 14-Part Type 1 CT, this sling is flat braided from one endless wire rope. Ends terminate in natural loops fitted with company's Crescent thimbles. Macwhyte Co.

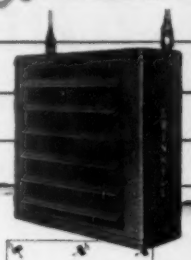
19—METAL MARKING STAMPS

Come in economical set of 36, packed in sturdy hardwood case

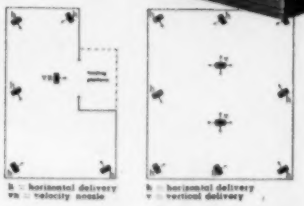
Include in the Rams Head Fractional Marking Set No. 3—company's newest and largest set—are 31 fractional figures, separated by 32nds, the whole numbers 1, 2 and 3, and a dash and an inches sign. The stamps are high grade tool steel, blued for rust prevention and have tempered striking heads to prevent chipping or mushrooming. Acme Marking Equipment Co.



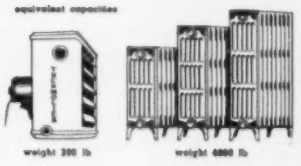
Consider the advantages of UNIT HEATING



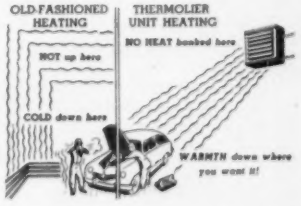
Heating comfort Unit heaters provide quick heating from a cold start. Desired temperatures are easily maintained within a close range. Heat is uniformly distributed in the working zone by forced air circulation. It is a very flexible system because different or changing heating requirements are easily satisfied by means of different models, a range of capacities, single- or two-speed motors and individual thermostatic controls.



Low first cost Unit heaters are so efficient and so compact that their heating capacity is often equivalent to the capacity of cast iron radiation or pipe coils of twice the cost. Additional savings are effected because the system requires a proportionately smaller amount of pipe, fittings and accessories.



Economy of operation Heat is forced down to the working level . . . not banked uselessly at the ceiling level. Heat is turned on and off merely by throwing a switch either manually or automatically by simple thermostatic controls. The rapid response means that heat is furnished only when and where it is wanted . . . no heat is wasted.



Adaptability to equipment and floor layout Unit heating is widely used in industrial plants and warehouses, garages, stores and public buildings. The units and the simple piping are overhead where they do not interfere with arrangement of operating machinery or equipment and do not take up valuable floor or wall space. Units are easily relocated at any time to meet changes in layout.

Thermolier unit heaters have important construction advantages The design of Thermolier unit heaters is the product of Grinnell Company's ninety-nine years of heating experience. Those responsible for heating like Thermolier's durability, freedom from maintenance troubles and dependable operation. Typical of its construction features is the patented internal cooling leg which permits the use of a plain thermostatic trap, the simplest, least expensive kind of trap. Other features are built-in drainage, continuous rated capacity and provision for expansion of U-tubes.

100th ANNIVERSARY
MANufactured PIPING of QUALITY

GRINNELL

Thermolier unit heaters

Grinnell Company, Inc., Providence, R. I. Branches: Atlanta • Billings • Buffalo • Charlotte • Chicago • Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach Los Angeles • Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Pocatello • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

PLENTY of WATER
AT LOW COST!
Guard against water shortage! Reduce costs of water supply! Gain both objectives by installing a Deming Deep Well Turbine Pump.
Built for wells 4" to 16" or larger and of practically any depth. Deming Turbine Pumps are available in capacities from 15 to 3000 gallons per minute.
Simple, sturdy construction; positive, automatic, water lubrication; adjustable impeller clearance and other advantages of these pumps assure dependable performance and economy of operation and maintenance.
A Deming Distributor is near you for prompt cooperation.
THE DEMING COMPANY
532 Broadway Salem, Ohio
Just Published!
Write for new, illustrated BULLETIN No. 4700 which gives you a "fund of facts" on Deming Deep Well Turbine Pumps.
DEMING
DEEP WELL
TURBINE
PUMPS

20—JET CLEANER

Is compact, economical unit for wall or post mounting

The little Model B is built to do a quick, thorough cleaning of plants, treadways, freight cars, vats and machinery. It provides a high temperature, large volume water jet at pressures adjustable up to more than twice the plant steam pressure. It's this combination of high temperature, large volume and great hydraulic force that washes away grease, slime and carbon.

The Model B consists of a venturi-injector mixing chamber connected to a steam and cold water line, a 50-ft length of high pressure hose, cleaning lance and special nozzle. A connection and control valve is provided for automatic addition of a detergent or solvent in any proportion to 10 per cent. Sellers Injector Corp.

21—FLOOR AGGREGATE

For sure footing even under oily, wet and slimy conditions

Bendelox is a blue-gray product of crushed blocks of ceramically bonded aluminum oxide screened to standard sizes—fine $\frac{1}{32}$ to $\frac{1}{4}$ in., and coarse $\frac{1}{4}$ to $\frac{1}{2}$ in. This aggregate is irregular in shape and so porous it becomes an integral part of a cement or asphalt floor.

Hard, tough and long-wearing, Bendelox provides a non-skid surface and traction increases with use. It's also said to offer a quiet, comfortable surface. Metals Recovery Co.

22—PROTECTIVE MASK

Has aluminum frame, sealed hood and cape of frosted Vinylite

Lightweight and flexible, the 7V Nitrometer-Acid Mask lets a man work freely and comfortably. It extends well down over the shoulders and is full enough to be turned up over the head when wearer isn't exposed to any hazard. The mask is fitted with a new type of headgear that adjusts to all head sizes. The window is heavy gage plastic. Industrial Products Co.

23—GATE VALVE

For 150 psi at 500 F is OS&Y corrosion-resistant flanged type

This new 12-in. valve is intended for use in petroleum refining, chemical processing, pulp and paper mills and other plants where valves of this size are required for service or processing lines. It's available in Types 302, 304, 316 stainless steel and in company's Pioneer metal for handling specific acids and corrosives. Face-to-face dimension of the flanged valve is 14 in. Teflon ring packing is standard. The Pioneer Alloy Products Co., Inc.

24—LUBRICATING UNIT

Has pressure primer for dispensing medium, heavy lubricants

Electric Lubriguns are built for fast, efficient lubrication of industrial machinery requiring high pressure application of medium and heavy grade lubricants that won't readily seek their own level. Units have a hand-operated screw-feed pressure primer that's spring loaded to maintain positive and continuous prime even at low temperatures.

Compact, streamlined and easily portable these units are suggested for use in plants where compressed air isn't available, or where electrically operated equipment is desired. Lincoln Engineering Co.

wherever connectors must move

Connection between air compressor and ping chamber is made through this ¾" I. D. seamless bronze American Flexible Connector.
This ¾" I. D. seamless bronze American Flexible Connector on a C. R. & L. Motorbus carries air from compressor to reservoir.

Photos courtesy Connecticut Railway & Lighting Lines.

Air-line piping for motorbus brakes and doors takes constant punishment from movement and vibration. In the piping illustrated here, American Seamless Flexible Metal Tubing provides safe, *flexible* connectors that can bend freely as the piping moves and vibrates.

There is a type and size for carrying fluids, steam, semi-solids, or gases. If yours is a special problem, American engineers offer you their long years of varied experience in connector applications.

For complete information on American Flexible Metal Hose and Tubing, write for literature. Address your inquiry to The American Brass Company, American Metal Hose Branch, Waterbury 88, Connecticut. In Canada, The Canadian Fairbanks-Morse Co., Ltd.

ANACONDA *American*

flexible metal hose and tubing

DATA FILE

of literature for the plant library

STANDARD CATALOGS, bulletins and handbooks are listed to aid plant engineers in maintaining a permanent, up-to-date data file. For copies of these, write the number preceding the desired bulletin on the card in the heavy insert, pages 19 and 20 and 77 and 78.

MATERIALS HANDLING

201 Improved Overhead Handling—In Bulletin C-1, 56 pp, are more than 100 photos of overhead handling equipment in use in all types of industries. Sketches of trolleys, cranes, switches, track and auxiliary equipment show construction, safety features, electrical advantages. Book also discusses engineering services offered. The American Monorail Co.

202 Handling Equipment Ordering Book—Ninety-pp Catalog 23 describes company's power trucks, power jacks, stackers and cranes, hand trucks, platforms and storage racks, and related equipment. Fully illustrated with photos and drawings it includes specifications, capacities, sizes, applications. Lewis-Shepard Products Inc.

203 Handling and Processing Equipment—Catalog 791, 32 pp, presents line of feeders, bin valves and level indicators, reduction machinery, vibrating screens and processing equipment, magnetic separators, elevating and conveying machinery, barrel packers, electrical controls for vibrating units, also chains and transmission machinery. Illustrated with photos and sketches of units and installations. Gives typical applications and advantages of equipment. The Jeffrey Mfg. Co.

204 Conveying Systems Manual—Unloading and conveying of dry pulverized material are discussed in 24-pp Bulletin FK-25. Text covers complete system and its operation, also stationary pump and related equipment and is illustrated by photos and dimensional drawings, with sizes listed. Several installations of conveying equipment are described, pictured. Fuller Co.

205 Manual on Electric Hoists—Catalog H-46, 44 pp, covers monorail and stationary hoists and car pullers and provides helpful information on fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, types of controls and factors to be considered before ordering. Contains full specifications and dimensional data, illustrations of models, many photos of installations. American Engineering Co.

206 For Overhead Moving Jobs—This is a booklet of engineering and application data on company's tramrail equipment. In addition to discussing what this equipment can do toward increasing a plant's handling methods, it illustrates and describes in detail the system's rail and arch design, switches, cranes and transfer bridges, hand operated carriers, hoists, cranes, buckets and grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

207 Manual on Overhead Conveying Systems—This comprehensive handbook, Conveying Manual A-86 contains more than 200 pp of information from manufacturer's catalogs on overhead track systems and conveying equipment. Book is generously illustrated with photos of equipment, installation and construction details, and it provides full engineering and application data as well as complete catalog listings of equipment. Richards-Wilcox Mfg. Co.

CONSTRUCTION

208 Roofing Manual—Full engineering data on manufacturer's roofing and their use is presented in Specifications 50, 36 pp. Covers not only coal tar pitch roofings, but also waterproofings, roof insulations, flashings, protective coatings. Includes illustrated instructions for the roofing of most types of roof construction, including methods of handling special conditions, amount of material required. Tar Products Div., Koppers Co., Inc.

209 Technical Data on Plexiglas—This is a file folder of technical and application information on Plexiglas sheets, rods and molding powders, covering their workability, physical properties, available thicknesses. Includes data sheets on the uses and advantages of Plexiglas in large area lighting, typical designs of coffers, photos of installations and a discussion of room lighting. Rohm & Haas Co.

210 Filtered Daylight—Booklet BRA 3-0749 FSR explains how the filtering of sun's rays by means of windows and skylights made of a special heat-excluding glass can provide better light and increased comfort and other benefits. Illustrated with photos of several installations, it includes suggestions on selecting the proper type of this glass for individual plant requirements. Blue Ridge Glass Corp., Libbey-Owens-Ford Glass Co.

211 Hard Boards of Many Uses—This attractively illustrated 24-pp booklet is devoted to company's Presdwood and pictures many of the ways it is being used. Discusses its manufacture and adaptability and describes several available types for exterior and interior applications, giving physical properties of each type. Gives finish specifications and explains and illustrates edge and surface cutting, bending and finishing. Masonite Corp.

212 Steel Grating and Treads—Bulletin 2296, 24 pp, explains and illustrates the

very, very, very little noise.

The New Swartwout Airlift Centrifugal Fan Type Ventilator

A completely engineered unit for efficient duct exhaust

● This new duct exhaust ventilator brings you the quiet ventilation needed for office, laboratory, dispensary, recreation rooms; schools, apartments and commercial buildings. Swartwout Airlift is powered by an unusually efficient centrifugal type fan unit incorporating the venturi principle. Other structural features maintain Airlift's air moving effectiveness while operating at *very low noise levels*. Write today for Bulletin 341D.

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Industrial Ventilation Specialists Since 1904

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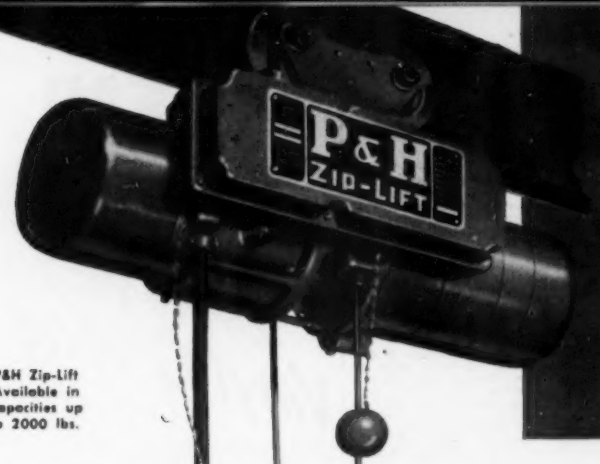
Now - more value than ever...

WITH 5 NEW FEATURES TO HELP CUT YOUR COSTS



P&H Zip-Lift Available in Capacities up to 2000 lbs.

Good news for hoist users! The Zip-Lift now brings you even more Added Value features to improve your service and help you cut handling costs. And not a penny has been added to the price!

NEW Magnetic Lower Limit Switch; cable cannot run out and rewind itself.

NEW Extra Ground Conductor on feeder cable for greatest safety.

NEW Reinforced Push Button Pendant takes more punishment — cuts replacement costs.

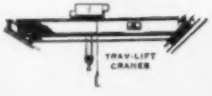
NEW Grooved Drum increases cable life.

NEW Improved Motor Brake.

P&H ZIP-LIFT
HARNISCHFEGER CORP. MILWAUKEE, WIS.

handle it "thru-the-air" at lower cost

See how dozens of handling problems have been solved by the Zip-Lift. This picture-filled book of ideas tells the story. Write for your copy of Bulletin H-20.



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SAFER — Full magnetic control with current reduced to 110 volts at the push-button. Crane type limit switch and large double brakes provide maximum safety. No open wiring.

LIFETIME CONSTRUCTION — Precision built — shaved gears running in oil—grease-sealed antifriction bearings—fully enclosed, moisture-proof, dust-proof, acid-proof.

SMOOTHER OPERATION — Motor specifically built for hoist service — to withstand frequent reversal. Loads controlled within a fraction of an inch.

ALERT SERVICE — Immediate stock delivery from qualified dealers everywhere — backed by 18 branch offices and 8 warehouses.

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HEAVY-DUTY PORTABLE VACUUM CLEANING UNITS

Maximum separation of fine dusts is accomplished in Hoffman vacuum cleaning equipment. Bag area is larger—for example, in the 3 H.P. Hoffco-Vac #30 (illustrated), a total of nine bags provide 30 sq. ft. of filter area.

Built for continuous *heavy-duty* service, Hoffman portable units (in 5 sizes) put real economy into your safety dust clean-up campaign, with these outstanding advantages.

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and higher vacuum mean you can do more cleaning for longer periods. Exclusive features for disposal of collected dust speed up cleaning operations.

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CANADIAN PLANT, NEWMARKET, ONT.

major advantages of manufacturer's "Electroforged" steel grating and treads, picturing many installations. Also includes sizes, specifications, safe load data. Blaw-Knox Div., Blaw-Knox Co.

213 Building Panel Engineering Data—This is an excellent 40-pp reference book on the use of steel and aluminum building panels for walls, decks and roofs, covering their applications, advantages and method of installation. Includes chapters on acoustically treated panels, panel fire resistance ratings, panel electrification, acoustic roofs, reinforcing floor forms. Provides selection data, dimensions, specifications. Book is generously illustrated. Detroit Steel Products Co.

214 Roofing Sheet Application Data—This is a compilation of basic data on Monel roofing sheet. Covers uses, characteristics, and properties, installation, cost, availability. Includes instructions on how to specify and table of theoretical weights of roofing sheet in available gages. Other tabular material presents suggested gages for use as roofing, wall flashings, leaders, cornices, other applications. The International Nickel Co., Inc.

215 Concrete Flooring—How a heavy-duty industrial flooring is intended to meet production needs and solve special problems is explained in Bulletin 601. Stresses durability of this emery aggregate concrete flooring, citing tests results and listing its advantages. Twelve installations are pictured. Walter Maguire Co., Inc.

MAINTENANCE

216 Industrial Products for Maintenance and Construction—This catalog is a comprehensive collection of data sheets on company's line of industrial products. It gives product descriptions, specifications and directions for use. Covers heavy duty mastic floorings, asphalt protective coatings, waterproofing and dampproofing materials, resilient floor covering underlayments, industrial adhesives and cementing. The Flintkote Co.

217 Building Maintenance Manual—Sixty-four-pp Handbook 7 is packed with useful information on the applications of an extensive line of floor surfacings and other maintenance products, as well as leak stoppers, external wall sealants, road patching, roofing materials. Illustrated throughout with photos and sketches it provides complete product information and step-by-step instructions for use. Shows how to analyze problem, select right product, estimate quantity needed and carry out the work. Flexrock Co.

218 Protective Surfacing—Bulletin 1570 presents specifications and characteristics of company's silicone coating aluminum, telling some of its uses and advantages. Also discusses surface preparation, coverage. The Dampney Co. of America.

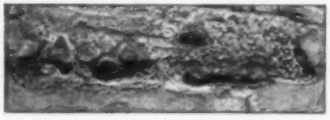
219 Painting with Aluminum—Form Ad-228 is a comprehensive 32-pp brochure, filled with factual information for all industrial users of aluminum paint. Basically, it explains how aluminum paints can be used to best advantage. It emphasizes that uses of aluminum paint by industry fall into three classifications: 1) for metal, concrete and masonry and other non-absorbent surfaces; 2) for weather exposed wood, and 3) for interior heated surfaces and decorative uses. Aluminum Co. of America.

220 Iron Cement Handbook—This pocket-sized 40-pp catalog on company's iron cements for repair work and other applications is filled with valuable suggestions for plant engineers. It discusses 10 different products and gives general tips on mixing and applying them. More important, it provides illustrated instructions for dozens of repair and maintenance jobs. Smooth-On Mfg. Co.

221 Preventive Maintenance Made Easy—The efficiency and long-run economy of a visible card index system of preventive maintenance control for plant and production equipment is explained in this folder. It tells how the system works, illustrates card forms and signals used, and shows how they operate to eliminate breakdowns.

10-YEAR TRIAL RUN ...Tests DAMPNEY Vinyl Coating

In April, 1939, we coated this panel with one of our early vinyl formulations — forerunner of our present Dampney Vinyl Coating — and submerged it, with this second panel of unprotected steel, in room-temperature water.



Neither was removed until November, 1949, when these pictures were made. After more than ten years' continuous immersion, with the results you see on bare steel, the vinyl film remained tightly bonded and the metal beneath, sound and dry.

This is the sort of product history that assures you superlative protection from Dampney Vinyl Coating wherever service conditions demand exceptional moisture and chemical resistance.

Dampney Vinyl Coating air dries in one hour . . . the surface it adds to metal is odorless, tasteless, nontoxic and non-flammable . . . it is as effective at and above the water line as it is below.

For data pertinent to your own coating needs, write us, detailing your requirements, and ask for Bulletin 1560.

MAINTENANCE FOR METAL

THE DAMPNEY COMPANY OF AMERICA

HYDE PARK, BOSTON 36, MASS.

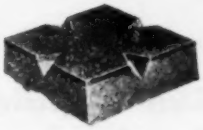
Blue Temper

FEREM FLOORS

Tough Floors for Tough Conditions

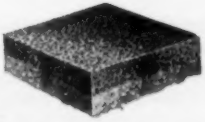
Cement

Notice the porous structure of the ordinary cement floor which is easily subject to crumbling by heavy traffic or shock loads as revealed by the grinding wheel test.



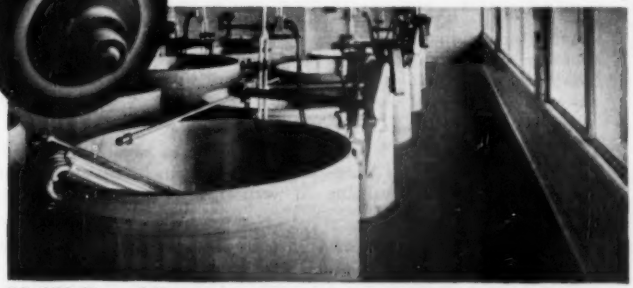
Metallic Hardener

In processed floors using metallic hardeners or metallic plating, the wearing surface is malleable but SLIPPERY and comparatively thin as the wheel test reveals.



Ferem "Blue Temper"

Ferem is the "Blue Temper" component. A dense, ductile and almost diamond hard floor surface results. NON-SLIP and highly wear resistant. The face of the test wheel polishes but does not cut.



20,000 lbs. of Ferem installed at the West Middleton Swiss Cheese Co.

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Please send complete data on FEREM FLOORS.

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COMPANY_____

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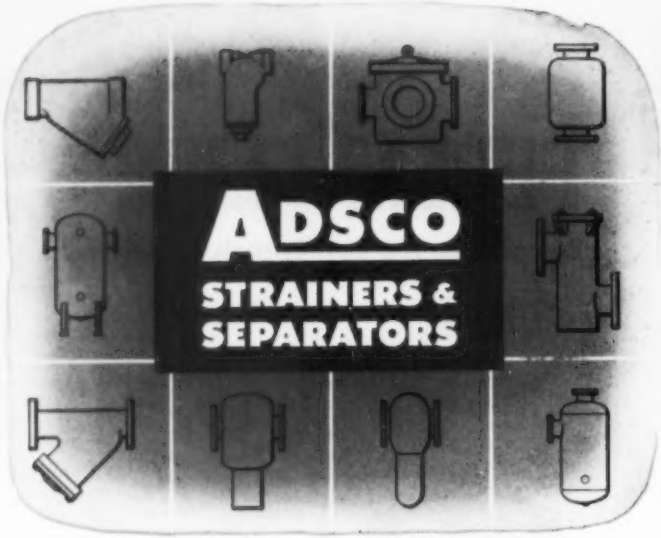

Prevent Expensive Repairs and Avoid Shutdowns

Stop trouble before it starts. Install ADSCO Strainers and Separators — keep operating equipment running at top efficiency.

ADSCO Y and T-Type STRAINERS keep the dirt and scale out of your equipment. Installed ahead of every regulator, pump, valve or trap, an ADSCO Strainer will reduce maintenance and prevent costly shutdowns. Designed with tapered seating of screen, and gasketed cap. Pressure drop no greater than through ordinary elbow. Sizes from ¼" to 6". For 9 to 1 screen ratio, and extra large pocket for sediment collection, use the ADSCO T-Type.

ADSCO SUCTION STRAINERS are used on lines carrying oil, water or other liquid. Usually installed on the suction side of pumps or other apparatus but can be used on discharge or other service. Solids are collected in large basket screen, easily removed for cleaning, and with quick opening cover. Straight through or offset connections in sizes from 2" to 10", for various pressures up to 300#.

ADSCO SEPARATORS remove moisture, oil and small solid matter from steam, air and gas lines. Deliver dry steam to equipment for increased efficiency. Available in vertical or horizontal types in sizes up to 10".

ADSCO RECEIVER SEPARATORS are recommended for use in steam lines to provide ample capacity for water or oil, and to eliminate pulsation from reciprocating equipment. Deliver steam at uniform pressure and separate slugs of water and oil. Optional piping connections. Large range of capacities. Sizes from 1½" to 12", 150 psi and 300 psi, and for temperatures to 650 F.

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Just off the press—16-page Bulletin No. T-46-50A

EXPANSION JOINTS — HEAT EXCHANGERS
STEAM TRAPS — STRAINERS — METERS
CASING — ANCHORS — GUIDES

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Leaders Since 1877

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maintain production schedules and reduce maintenance costs. Systems Div., Remington-Rand, Inc.

222 Turbine Repairs—Vol. 5, No. 1 of Metco News tells of the economy of metallizing in turbine repair work, citing several case histories in which savings were effected by this method. Illustrates several examples of turbine repair jobs. Metallizing Engineering Co., Inc.

223 For Overhead Maintenance Jobs—Here is an illustrated specification sheet on company's hydraulically raised rolling maintenance tower engineered for one-person operation. Tells where unit is profitably used and how it's built to clear doorways. Discusses operation and structural details. Safway Steel Products, Inc.

224 Drip Preventive Handbook—The insulation of pipelines, tanks, cold air conditioning ducts, and wall surfaces against corrosion and condensation drip is covered in this pocket-size, 32-pp handbook, Form F-17. Describes an insulation coating and its applications and tells how to prepare surfaces for it and apply it. Photos illustrate these instructions and show coating in use. Technical data includes tables showing pipe and tank surface coverage and humidity charts. J. W. Mortell Co.

225 Adjustable Scaffolds — Lightweight aluminum alloy scaffolds with adjustable legs and "built-in" safety factors—locking casters, platform railings, platform support braces, increased strength—are described and illustrated by photo in this bulletin. Shows how easily scaffolds are carried and erected and how they are adaptable to many maintenance jobs. Up-Right Scaffolds Div., Up-Right, Inc.

ELECTRICAL

226 Motor Handbook—Bulletin MU-183 is a collection of more than 60 pp of engineering and descriptive data on company's line of motors. Covers many types, including splash-proof and explosion proof motors, gear motors and motors intended for use in chemical plants, for oil well pumping, punch press motors, elevator, crane and hoist motors. Illustrated throughout; includes price lists. Wagner Electric Corp.

227 Voltage Control—Bulletin 547, covering variable transformers and voltage regulators, illustrates and describes available models, stressing their special features and including specifications, dimensional data, ratings and connection arrangements. Also presents electronic electro-mechanical regulators. Includes price list. The Superior Electric Co.

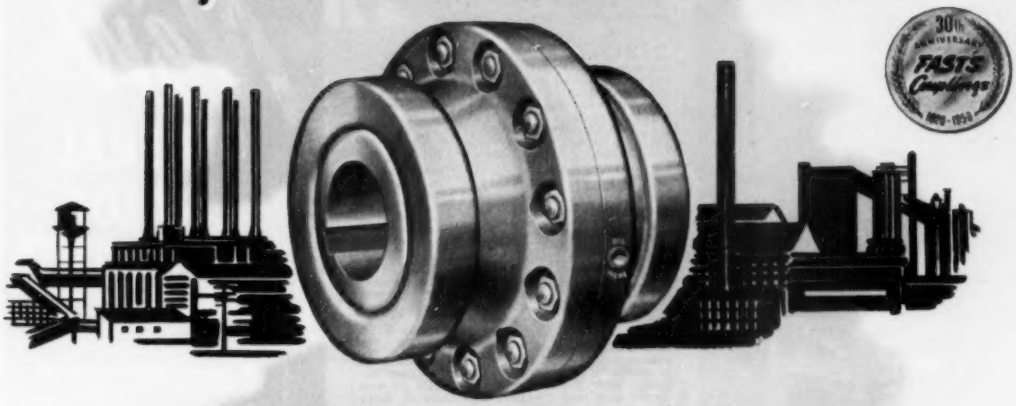
228 Selenium Rectifiers—Booklet DB-19-025 on standard and high-voltage selenium rectifiers for power supplies and electronic circuits gives efficiency curves for both types, together with discussions on efficiency and service life, back leakage and reverse resistance and forward resistance. Life characteristics of both cell types for various overload conditions or high ambient temperatures are plotted graphically. Westinghouse Electric Corp.

229 Power Distribution Feeders—Catalog TEB-1, 40 pp, is devoted to heavy-duty units used as main feeders in company's power distribution system, giving construction details, engineering data, application tips. Includes comparative analysis between this and other methods of power distribution on basis of cost and performance. Also contains full listing of parts. The Trumbull Electric Mfg. Co.

230 Precision Switches—Catalog 81, 20 pp, covers industrial switches for a-c circuits. Describes and illustrates general purpose basic switches, reset basic switches, auxiliary actuators, enclosed switches, explosion-proof and splash-proof types, limit switches and extra small switches. Includes full ordering information, technical data and definitions, price list and discount schedule. Micro Switch.

231 Answer Card—Rules of thumb for answering questions on capacities and applying power-factor-improvement are

you can FORGET COUPLING SHUTDOWNS—



INDUSTRY REPORTS—

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These FAST'S COUPLING *Services save you money!*

UNSURPASSED ENGINEERING . . . *Koppers Engineers are acknowledged the best in the coupling industry. Their practical knowledge, backed by 30 years of coupling experience, is at your service!*

IMMEDIATE DELIVERY . . . *All standard types and sizes are available for immediate delivery from "on hand" stocks. In case of emergency, just wire factory for special rush delivery!*

LOWEST COST PER YEAR . . . *Fast's Couplings will outlast equipment they connect if properly maintained. Their cost may be spread out over 25 years or more, offering you lowest coupling cost per year!*

In oil fields, steel mills, power plants . . . all through industry . . . cost-wise executives report that *Fast's Couplings,* designed, manufactured and guaranteed by Koppers, are the best insurance against coupling failures! Take a tip from these users who know. Specify Fast's and forget *your* coupling problems!

By specifying Fast's, you get the benefit of Koppers Engineering Service, acknowledged best in the industry. Koppers Engineers, backed by 30 years coupling experience, study your problem . . . then show you *which* Fast's Coupling fits your application, (and more important) *why* you need it!

Only Koppers can offer you this valuable service . . . only Koppers offers Fast's, the original gear-type coupling. Fast's Couplings assure you freedom from expensive coupling failures in your plant because Fast's have no perishable parts to fail!

GET THE FACTS: Mail coupon today for your free copy of the Fast's Coupling Catalog, published by Koppers. Shows how Fast's operate, describes the many sizes and types. Gives full details about Koppers Engineering Service. Send for your copy today.

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printed on a double card small enough to fit in plant engineer's wallet. With this card he can quickly compute the answers to the questions: How many kilovars? What power factor? How much voltage rise? Diagrams illustrate formula. Apparatus Dept., General Electric Co.

232 Selector Switch Data—Here is an engineering data folder complete with target sheet to aid plant engineers in understanding and applying company's push-pull-selector switch. Features detailed illustrations, description and typical applications. Explains in detail how switch provides a single master control that will serve eight to 16 operations by pulling the handle to start, pushing to stop. The Arrow-Hart & Hegeman Electric Co.

233 Power Distribution Cable—Bulletin RR-1 describes an economical, easily installed, multi-purpose cable offering supersaging, heat and moisture resistant insulation as well as a Neoprene sheath. Illustrates construction of cable, touches on its advantages and provides full specifications and engineering data. Rome Cable Corp.

234 Motors for the Dirty Jobs—Totally enclosed, fan-cooled motors are described in Bulletin SL-300-2A. Illustrates and explains how these motors are built to run cooler and stay cleaner, especially in dirty atmospheres. Includes complete dimensional and ordering data. Pictures several of these motors at work on machine tools, carding machines, acid pumps. Crocker-Wheeler Electric Mfg. Co., Div., Elliott Co.

235 Electrical Diagram Guide—The purpose and use of electrical diagrams supplied with switchgear equipment are explained in Bulletin GET 1293A. It was written to help those who install, operate or maintain switchgear equipment make the best use of the diagrams that come with such equipment. Discusses in detail one-line, elementary, connection and interconnection diagrams. It tells their scope and uses and illustrates symbols used and common variations, and explains ASA device function numbers, conventions. General Electric Co.

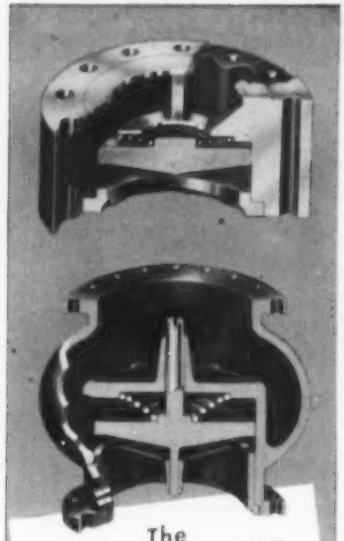
236 Distribution Duct Engineering Data—Bulletin 427-4 contains 32 pp of dimensional data for estimating ventilated duct for feeder circuits, plug-in duct, and plug-in duct for branch circuits. Illustrated throughout, the book also contains useful information on bus duct, instructions for laying out distribution duct jobs and pointers on estimating. Two pp are devoted to diagrams and symbols used in layouts. BullDog Electric Products Co.

237 Manual of System Planning, Preventive Maintenance—This 50-pp book covers complete story of electrical system planning and maintenance. Covers system functions; code reference chart; voltage drop tables; power factor charts; guides for motor wiring; guides for lighting wiring; electrical system records; supplementary feeder schedule; preparing electrical plans; switchboard and feeder schedule; riser diagram of complete system; motor and control schedule; symbols for wiring plans. Anaconda Wire & Cable Co.

238 Power Circuit Transformers—A handy ordering table is included in Folder C-15 on dry type power circuit transformers. Transformers from 50 to 15,000 va capacity are cataloged. A typical wiring diagram showing use of higher voltage circuits is included. Jefferson Electric Co.

PIPING, TRAPS, STEAM ACCESSORIES

239 Steam Trap Manual—"Solving Steam Trap Problems," 36 pp, covers correct trapping practice for unit heaters, jacketed kettles, autoclaves, submerged surfaces, hospital, kitchen and laundry equipment, steam mains, header drips etc. Tells how to select size and determine lift of trap. Explains theory, operation, maintenance; gives details of simplified piping for steam traps. Also discusses float traps, air release valves and pipe line strainers. Specifications, capacities and some prices are given. The V. D. Anderson Co.



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With its renewable disc and seat, non-wearing conical spring, the Williams-Hager Valve offers dependable protection in any position—horizontal, vertical with flow upward, vertical with flow downward and angular. Easily installed or reseated without special tools, it is available in standard pipe sizes from 1" to 20".

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HERE IT IS!

Fig. 3639-3678 Self-Priming Centrifugal

Goulds NEW Self-Priming Pump

Only GOULDS gives you all five of these outstanding advantages

1. Absolutely no valves of any kind in pump—nor are any needed in installation. Liquid can drain out of discharge and suction line through pump without affecting priming ability.
2. No recirculation of liquid after completion of priming action.
3. Efficiencies comparable to quality straight centrifugal pumps are thus obtained.
4. Positive fast-acting self-priming similar to priming ability of positive displacement pumps.
5. No large or bulky priming chambers or reservoirs, providing a compact unit at low cost.

APPLICATIONS:

Any service where suction lifts are encountered. Particularly adaptable for automatic service or where liquids to be pumped contain air or gas. Pump will automatically free itself of air and positively will not vapor lock.

Open impeller type. Sump service • Sewage effluent • Marine-bilge pumping, etc. • Mine gathering and dewatering • Dewatering excavations, cellars, etc.

Enclosed impeller type. Cold and hot water • Low pressure fire service • Pumping from underground supply • Irrigation • Sprinkling • Engine jacket cooling water service • Volatile liquids and light oils • Ice core sucking.

SIZES—CAPACITIES AND OTHER FEATURES

39 Models and Sizes

¼ to 5 H.P. ratings

Open and enclosed impellers

Capacities to 120 G.P.M.

Heads to 135 ft. depending on capacities

Suction lifts to 25 ft.

Also available in Flexible coupling motor drive or belt drive and close-cupld gasoline engine-driven unit.

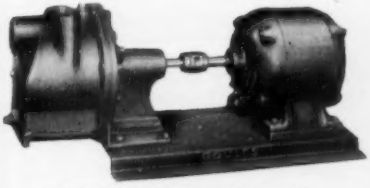

Fig. 3739-3789 Flexible coupling type drive

Patents Pending

FOR FULL DETAILS WRITE FOR BULLETIN 636.1

MEMBER

Goulds PUMPS INC.
Seneca Falls
New York

High tractive efforts . . . sustained brute tonnages . . . impose super brush requirements on the generators and traction motors of today's Diesel Electrics.

Speer carbon brushes reflect the latest engineering advances and represent years of manufacturing experience . . . "Service" designed to meet all industry requirements.

If you have a "brush" design or maintenance problem why not take advantage of Speer's complete laboratory facilities? Write us, today.

Speer
CARBON COMPANY
ST MARYS PENNA

240 How to Select Steam Traps—Contending that there is no universal trap, Selection Chart 1600 describes and illustrates thermostatic, inverted bucket, float thermostatic, and liquid expansion types giving advantages and recommendations for use. Includes table showing first and second choice of trap types for 34 applications. Sarco Co., Inc.

241 Steam Traps—Bulletin 315 presents company's smaller steam traps designed for greater performance capacities. Illustrates and explains their design and operation, tabulates sizes and capacities and includes prices of traps and accessories. Also describes briefly and illustrates a differential drainage and boiler return system. Stickle Steam Specialties Co.

242 Steam Separators—Bulletin S-14-C, presents line of separators for removing unwanted elements from steam, air and other vapors. It is profusely illustrated with photos, diagrams and line drawings, gives full specifications, selection and ordering data on company's hello-centrifugal separators of both vertical and horizontal types. The Swartwout Co.

243 Steam, Air, and Gasoline Traps—Illustrated Catalog 250 describes several types of thermostatic steam traps for pressures to 225 lb; expansion steam traps for pressures to 250 lb; weight-operated traps for steam, air, gasoline pressures to 1500 lb; piston-operated steam traps for pressures to 650 lb; also steam, air and gas separators. Complete with capacity tables, installation diagrams, discussion of typical applications, a section containing data, charts and formulas for determining proper size trap. W. H. Nicholson & Co.

244 All-Service Separators—Bulletin 2950 tells advantages of company's all-purpose separators for use on both horizontal and vertical lines as well as separator built particularly for comparatively low steam pressures. Explains and illustrates how separators act to remove oil or water from steam or air lines. Includes dimensions, list prices as well as data on drainage units. Cochrane Corp.

245 Steam Plant Equipment—Blow-off valves for low, medium and high pressure service, water columns and gages, liquid level indicators, expansion joints, traps, strainers and other steam plant equipment for utilities, industries and institutions are described and pictured in 12-pp Bulletin G-1307. Illustrations include photos, sketches showing design details and construction. Yarnall-Waring Co.

MECHANICAL POWER TRANSMISSION

246 Chain Drive Manual—Catalog SCE-50, 68 pp, provides data on company's silent chain drives, giving their advantages, recommended applications. Also gives information on chain length calculation, installation and maintenance, dimensions, ratings, prices. Actual-size photos illustrate chain types, pitch. Includes full ordering data on sprockets.

Catalog CR-48, 16 pp, contains similar information on company's roller chain drives. Both books are available; ask for either or both. Whitney Chain & Mfg. Co.

247 Gear-Type Coupling—Bulletin 101 tells why company's gear type coupling can provide reduced maintenance and long-run economy when used with gas blowers, turbine driven pumps, mills, compressors. Stresses couplings' flexibility and illustrates 16 basic designs. Fast's Coupling Dept., Koppers Co., Inc.

248 Steel Shaft Data—Bulletin G-7, 20 pp, originally compiled for use by company's own engineers, contains formulas, curves and tables that will materially assist in determining proportions, stresses, combined torsional and bending loads in round, square, hollow, keyway and stepped shafts. Also includes photos showing production of company's worm gearing. IMO-

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DeLaval Products Div., DeLaval Steam Turbine Co.

INSTRUMENTS AND CONTROLS

249 Self-Operating Regulator—Bulletin 329 contains information on a regulator for use on water and oil heaters, crude oil treaters, tanks, vats and other processing equipment. Includes tables helpful in selecting the proper size regulator and illustrates the broad scope of automatic control. Also contains layout drawings of several applications. The Powers Regulator Co.

250 Laboratory Thermometers — Chemical thermometers, low temperature thermometers, laboratory thermometer sets, calorimeter and differential thermometers and special test thermometers for various applications are pictured and described in Bulletin C, 24 pp. Gives specifications, ranges and sizes and explains use of instruments. Also includes nomograph for emergent stem correction. Precision Thermometer & Instrument Co.

PUMPS

251 Pump Catalog—Turbine type and centrifugal pumps for a wide range of industrial pumping jobs are described and illustrated in this booklet. Includes specifications, on all types cataloged, tells their special features and where to use them. Aurora Pump Co.

252 Centrifugal Pump Care—Sixteen-pp Bulletin 08X6258A is a revised handbook on the care of all makes of centrifugal pumps, giving the how and why of pump construction and their effect on pump maintenance. This informative booklet tells how to figure head and it carries tables to help determine friction loss. Causes and cures for various sources of troubles are offered along with a new maintenance timetable. Also discusses how to protect pumps against cavitation, water as a pump lubricant, common mistakes in packing stuffing boxes. Allis-Chalmers Mfg. Co.

253 General Service Pumps—Bulletin 30, covering company's helical gear pump, explains its "progressing cavity" principle of operation and lists some of the wide variety of materials this pump is designed to handle. Dimensions, speeds, capacity information and other data are included for both standard type and tubular type for higher pressures, greater resistance to abrasion. Pump Div., Robbins & Meyers, Inc.

254 Centrifugal Pumps—Bulletin W-318-B21 on two-stage double suction centrifugal pumps for pipe lines, boiler feed, general water service and other applications, illustrates their design and construction and discusses their important features. Includes dimensions and selection chart. Worthington Pump and Machinery Corp.

255 Process Pumps—Bulletin 1125 describes manufacturer's new line of process pumps designed for handling hot or cold clear liquids, viscous liquids, corrosive liquids or liquids carrying suspended solids, in capacities from 15 to 800 gpm. Bulletin includes cross-section illustrations showing both open and closed impeller designs and photos of special construction features. Also provides capacity and head range diagrams for 1750 to 3500 rpm speeds and dimension table. De Laval Steam Turbine Co.

VALVES

256 Reducing Valve Engineering Data—Bulletin 962 presents data on pressure reducing valve, explaining how its streamlined contour contributes to efficiency of performance. Discusses and illustrates valve's straight-line flow, wide opening, tight closing and other design features. A. W. Cash Co.

257 Control Equipment—General Catalog 001, 30 pp, is devoted to measuring and control equipment for water and sewage works, power and processing industries. Catalog illustrates and describes in detail: venturi tubes and meters, controllers, gages, manometers, pilot equipment. In-

(Continued on page 80)

Cab-operated electric hoist operating in conjunction with a single beam crane picks up the load *at the door*—delivers it directly to storage area. No re-handling. No aisle space or turning radii needed. Minimum head room required. Every cubic foot of space is put to work.

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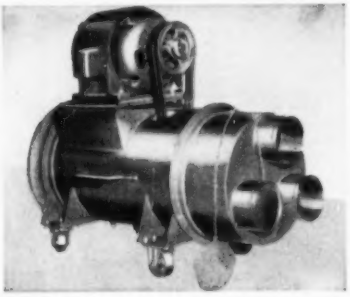

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PROPELLER-TYPE FANS AND BLOWERS—ROOF VENTILATORS—UNIT HEATERS • ENGINEERING OFFICES IN PRINCIPAL CITIES

(Continued from page 28)

135 Powerful Little Hoists—This 8-pp bulletin introduces company's "Bob-Cat" heavy-duty electric hoists developed during the war for the armed forces and acclaimed for their light weight, small size and flexibility of use. Well illustrated with photos, diagrams and line drawings, bulletin gives full descriptions, specifications, prices and ordering data. The Ohio Electric Mfg. Co.

136 Pneumatic Conveying Systems at Work—Seventeen typical installations of pneumatic conveying systems covering such widely different jobs as handling peanuts at a candy factory to unloading ships are sketched and described in Bulletin 103. Lists more than 25 general types of materials handled successfully by this means and explains how company's pneumatic conveying systems operate. Convair Corp.

137 Crane Control—Bulletin C-30 explains how manufacturer "harnessed a magnet to give you the smoothest control ever devised for overhead cranes." Graphs are presented to show how this full magnetic control provides good regulation on both hoisting and lowering operations with varying loads, as compared with handling of same loads by other means of control. Design and construction features of this control are explained and illustrated. Harnischfeger Corp.

138 Trucks of All Types—Bulletin 170A is filled with photos and provides a quick, overall picture of company's power and hand lift trucks, portable and hydraulic freight elevators and other handling equipment. More than 20 types of equipment are illustrated. Revolvator Co.

139 Conveyor Systems that Grow—This booklet describes sectional steel belt conveyor units and power turns shipped as units for assembly at the plant . . . units that can be arranged or added to according to plant needs. Operating and construction features are discussed and size information on both straight lengths and turns provided. Nine installations of these conveyor systems are pictured. Sermat Div., Peterson Products Corp.

140 Pneumatic-Tired Yard Truck—Illustrated Bulletin 5124 describes a 4000-lb capacity fork truck with telescopic lift, oversized pneumatic tires, and other design features intended to combat operator fatigue and high maintenance cost commonly found in rough and dusty outdoor applications. Full specifications, load capacity data are provided. The Yale & Towne Mfg. Co.

141 Fastenings for Conveyor Belts—Here is a collection of data covering all types of fasteners for conveyor belts, including hinged, repair plates, lacing, hooks, round belt couplings, and also lacers and cutters. Provides full ordering information, prices and instructions for use. Also includes descriptive material on company's gear, wheel and bearing pullers. Armstrong-Bray & Co.

VENTILATING, DEHUMIDIFYING

142 Replaceable Air Filter—Introducing the Amer-glas filter, which comes in standard sizes for forced heating, ventilating and air conditioning systems, Bulletin 311 explains the operating principle of this filter and discusses its resiliency, efficiency and maintenance. Also gives sizes and installation data on frame units. According to bulletin, the Amer-glas filtering media consists of continuous strands of glass filaments held at contact points with a high temperature plastic bond to form a resilient pad. The pad is sprayed with an odorless and non-flammable adhesive and placed in fiberboard casing between metal grills. American Air Filter Co., Inc.

143 Ventilator Catalog—Nine types of roof ventilating equipment for industrial structures are cataloged in 24-pp Bulletin 240, which provides excellent help in selecting correct type of ventilators for individual plant requirements. Illustrated with photos and sketches showing how each ventilator works, it includes dimensions, capacities, specifications and methods of installation. The Swartwout Co.

144 Because Moisture Isn't Pink—Under this title, 30-pp Bulletin 216 explains that while high humidity doesn't show it can and does spoil many a product in process and storage. Tells how typical plants solved the excess moisture problem by installation of company's electric dehumidifiers. Describes and illustrates their use in such applications as spot drying, material handling operations, chemical processing, compressed air uses and metallurgical work. Pittsburgh Lectrodryer Corp.

145 Industrial Ventilating Fans—This informative catalog is comprised of engineering data sheets on company's Series 18 direct-drive industrial ventilating fans in 3 to 5 ft dia, with capacities from 11,000 to 30,000 cfm. Provides details on fans' construction, performance, installation and maintenance, also gives prices. Also contains information on ventilating fan applications and the planning of ventilating systems. This book is especially of value to engineers whose plants present problems caused by lint or dust laden air. The Moore Co.

NATURAL LIGHTING

146 More Daylight per Dollar—"Save 1/3 to ½ on Cost of Daylighting for Your Corrugated Buildings," is the title of this bulletin. It features the use of Corrulux, a new lightweight, translucent building sheet made to nest with corrugated metal or asbestos and available curved for use in quonset buildings. Requires no sash or framing, is weather resistant and can be nailed and sawed. Corrulux is available in six colors and has many other industrial and decorative uses. Corrulux Corp.

147 For Daylight at Its Best—An 8-pp booklet, Form BRA 3-7042PGR discusses the use of company's Akio glass in daylighting installations and tells why it promotes better seeing, less eyestrain and cooler interiors. Explains how it reduces incoming solar heat. Gives suggestions on selecting the right type of this glass for individual plant needs. Photos show typical installations. Blue Ridge Glass Corp., Libbey-Owens-Ford Glass Co.

FILTERING, SEPARATING

148 Screen and Filter Cloth—What's available in wire cloth woven of Monel, nickel and Inconel, the special advantages of wire cloths of these metals, and the companies that weave them are listed and discussed in this bulletin. Photos show six standard weaves, illustrate some of the applications in the chemical and petroleum industries, in metal processing and high temperature work. Also listed are more than 150 products handled by this wire cloth. The International Nickel Co., Inc.

149 Magnetic Separators—Bulletin 11 illustrates some of the processing equipment on which company's permanent non-electric magnet is utilized, explaining how this Alnico magnet is designed for efficient, economical removal of tramp iron. Bulletin 13 gives specifications and installation instructions. Both bulletins available. Sprout-Waldron & Co., Inc.

WATER TREATING

150 Two-Stage Water Conditioner—Bulletin 4801 describes company's water conditioner which combines the advantages of both hot process and zeolite softening. Explains operation of this softener in which the first stage is the hot process using lime or Dolomite lime and the second stage in one in which zeolite softener reduces hardness to zero. Discusses advantages of the combination—silica reduction, low alkalinities, lower CO_2 in steam, lower costs and tells applications to high pressure boiler plants. Cochrane Corp.

151 Merits of Threshold Treatment—Prevention of lime scale deposition by "threshold treatment" of water is described in Bulletin 514112. Explains how Calgon, a vitreous sodium phosphate is dissolved and the solution added continuously to the water in concentrations from 1 to 10 ppm. Slightly higher concentrations have proved effective, it states, in eliminating deposition of other scale-forming salts such as calcium sulfate, calcium silicate, various barium salts and calcium carbonate. Typical applications are cited—prevention of lime scale deposition in boiler feed water lines, water heating, recirculating cooling systems, multiple-effect evaporators, and after-precipitation following lime-soda softening. Calgon, Inc.

152 New Clarification and Softening Method—Contact reactors that utilize an old chemical laboratory principle—that of previously formed precipitates added in the form of sludge and slurry acting in the manner of catalytic agents to accelerate chemical reactions—are described and illustrated in 16-pp Publication 2001. Explains how reactors work to accomplish successful utilization of the sludge contact process and describes both round and rectangular types. Lists 11 important applications of this method ranging from clarification of surface waters for industrial and municipal purposes to the removal of iron and manganese from well waters. Cochrane Corp.

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FIRE EXTINGUISHERS, SAFETY EQUIPMENT

153 **Dry Chemical Extinguishers**—Newly designed quick-acting dry chemical type fire extinguishers in 20 and 30 lb sizes are introduced in Form C-164. Cutaway sketch illustrates design features of the extinguisher, showing how it works. Text covers on-the-scene recharging of the self-contained unit. C-O-Two Fire Equipment Co.

154 **Matting Selection Data**—What you should know about floor matting is told in three new catalog sections. Section 6120 on runner matting describes and pictures corrugated matting, "Ezy-Kleen" matting, spike resistant matting, multi-link matting, fiberized counterway matting, "Durotred" matting, sponge-back corrugated matting, and a flexible Koroseal type especially valuable where oil and chemicals are prevalent, traffic heavy and service constant. Data and specifications included on each type. Section 6160, on company's perforated matting, describes its construction and outlines types of application on platform, standard, and special perforated mats, gives instructions for ordering, specifications. Section 6110 describes utility mats. The B. F. Goodrich Co.

155 **If You Use Phosphoric Acid**—Equipment needed and procedures recommended for handling 75 per cent phosphoric acid in tank car quantities are described in this booklet. In addition to specifications for tanks, pumps and pipes, it includes step-by-step explanations of several methods of unloading phosphoric acid cars, from spotting to preparing car for return. Phosphate Div., Monsanto Chemical Co.

156 **Industrial Aprons**—Catalog Section 12010 features aprons made of Koroseal, company's flexible material with high resistance to scuffing and scratching, greater resistance to abrasion than rubber, and resistance to most acids, alkalis, chemicals, oil, grease, fats and caustics. Describes and pictures the acidproof, flim and heavy duty types of Koroseal aprons. Also describes aprons made of different types of rubber for light and heavy duty use. The B. F. Goodrich Co.

INSTRUMENTS AND CONTROLS

157 **Counters, and How They're Used**—This bulletin on mechanical counters actuated by electrical impulses, depicts counters for use in machine shops, laboratories, industrial plants. Explains how variable components multiply the recording possibilities for a variety of counting and timing jobs. Streeter-Amet Co.

158 **Air Gage**—Stressing the economy, simplicity, convenience and other advantages of company's CompAIRator, Catalog 610 also discusses the design and applications of this air gage for laboratory, machine and bench use. Describes and illustrates single-dial and duplex-dial models, also gaging accessories. Dimensional data is provided and scales illustrated. The Taft-Pierce Mfg. Co.

159 **Dynamic Pressure Instrument**—Here's a small folder describing company's Electro-Pressuregraph and supplementary instruments for precision research on dynamic pressure and displacement phenomena. Illustrated with photos, tells how the Pressuregraph, when used with the Synoro-Marker, provides complete pressure-time studies of internal combustion engines, compressors, injection pumps, pipe lines. Electro Products Laboratories, Inc.

160 **Liquid Gage**—Illustrated Bulletin G101, 12 pp, presents a hydrostatic instrument that directly shows the weight, volume or depth of liquids in storage or in process. Explains how it operates to measure acids, solvents, tar, latex, milk and other liquids in open, closed or pressure tanks of all sizes. Gives details on construction, calibration and accuracy, together with specifications on five standard sizes. Also describes and illustrates typical applications for weighing liquids in mixing and formulating, remote control of inventory, and reducing fire and accident hazards in the food, chemical, petroleum industries. King Engineering Corp.

161 **Recording Thermometers**—Bulletin T940 is a 44-pp fact-filled catalog on company's "Series 500" line of thermometers. Liquid-filled, vapor pressure, and gas-filled types are described in models for recording, indicating, controlling, and telemetering of temperatures. Each is fully described along with information on operating principles, characteristics of operation, temperature sensitive bulbs, recording charts, and accessories. Resistance type thermometers, humidity instruments, and time-temperature controllers are also described. In addition to photos, the book is liberally illustrated with reproductions of actual chart records. The Bristol Co.

PUMPS, TURBINES, ACCESSORIES

162 **For Many Pumping Jobs**—The Series A313A, latest of company's well-known IMO pumps and one especially designed for low cost standardized, quantity production, is described in illustrated Bulletin Y313A-E. This is a general service screw-type rotary pump for petroleum products and other light or viscous fluids as required for rotary and steam atomizing oil burners, oil transfer, lubrication, hydraulic systems and similar services. Bulletin contains a cross-section drawing, description of the IMO pumping principle, viscosity tables, motor frame sizes. DeLaval Steam Turbine Co.

163 **Automatic Pumping for Elevated Tanks**—Bulletin 1259 describes company's Autocon Mototrol pressure operated pump controls with twin bellows for elevated tank systems, and tells how they afford better liquid level control. Shows how motors work to provide accurate control and discusses their flexibility, protection provided, and easy installation and adjustment. Sequence of operation is illustrated and explained, specifications given. Automatic Control Co.

164 **Cradle Mounted Centrifugal Pumps**—The construction features of centrifugal pumps in 20 to 350 gpm capacities and designed for process and refinery service are described and illustrated in Form 7212. Includes dimensions and specifications. Cameron Pump Div., Ingersoll-Rand Co.

165 **Multi-Stage Turbine**—Bulletin S-148 features design details of company's multi-stage turbine. Illustrated with photos and drawings, it gives data on casings, lagging, blades, nozzles, wheels, shafts, diaphragms, bearings, interstage and end glands, governors, synchronizers, governor valves, steam strainers, nozzle control valves, auxiliary oil pump and lubrication. The Terry Steam Turbine Co.

166 **Seals for Centrifugal Pumps**—A mechanical seal that's easily installed and maintained is the subject of 12-pp Bulletin 49-1000. According to bulletin, these seals are especially designed for sealing stuffing boxes in centrifugal pumps handling hot and cold liquids, either corrosive or non-corrosive. Available types—a single seal low-pressure type, an oil-lubricated double seal for high pressure use with cold service where pumped liquids have little lubricating value, and a high-pressure single seal for refining process, chemical industry and general purpose use, are described, illustrated; includes maintenance suggestions. Byron Jackson Co.

WELDING, HARD FACING

167 **Directory of Welding Supplies**—Manufacturer's line of electrode holders, protective shields and welding cable are described and illustrated in Bulletin 407. Also lists more than 35 electrodes available and includes brief reviews of books and educational movies on arc welding. The Lincoln Electric Co.

168 **Hard-Facing Manual**—This newly-published hand-book should prove a helpful guide to plant engineers interested in prolonging the life of parts and equipment. It tells the complete story of hard-facing. Describes how to select the right alloy; which welding process to use; and gives simple, step-by-step instructions for applying the various rods by both the oxy-acetylene and metallic-arc welding processes. Information is given on the properties and available sizes of 12 hard-facing materials. Haynes Stellite Div., Union Carbide and Carbon Corp.

OTHER EQUIPMENT

169 **Improved Concrete Insert**—A new, lower cost concrete insert with a continuous slot that permits attachment anywhere along channel run is described and illustrated in Bulletin CI-3. Advantages of these inserts, some typical applications are pictured. Specifications, load data, and ordering information covering the 3 in. to 20 ft stock lengths, cover plate, closer strip and two types of end caps are included. Unistrut Products Co.

170 **Patches with Long Lives**—An iron asphalt patching material which produces long life repairs and permits easy, fast patching or resurfacing of worn concrete floors is the subject of Form MQ-1. Tells advantages of this material, where it's recommended for use and where not recommended, how to estimate quantity needed, and gives illustrated step-by-step instructions for patching and resurfacing. According to bulletin, this material overcomes early breakdown under impact, particularly of feather edges. The Master Builders Co.

(Continued on page 84)

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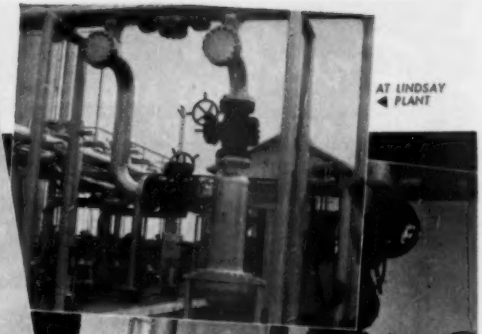

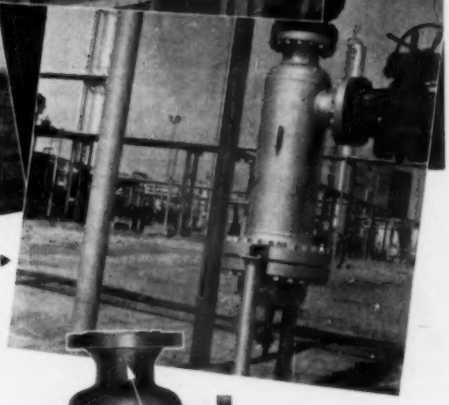

AT ANTIOCH PLANT ▶

Staynew FILTERS

in One of the World's Largest Oil Field Operations

Here's a typically tough Staynew-solved problem: at the new Garvin County plants, in Oklahoma's fabulous Golden Trend Area, highly abrasive aluminum oxide in lines carrying natural gas would cause serious damage if allowed to pass into the compressors. Staynew Filters in all three plants, processing a total of 40 million cu. ft. a day, remove all abrasive material and reduce compressor wear to a minimum.

Special construction was required in each filter to handle pressures frequently approaching 800 PSI. Since all three plants operate 24 hours a day, dual filter installations might be expected. However, due to the exclusive Staynew design, a single filter only was needed in each plant—and experience proves that servicing is necessary no oftener than twice a year.

What Is YOUR Filtration Problem?

The above group of filters represents only *one* of the thousands of Staynew installations in critical service throughout industry. In designing filters for these installations, an unsurpassed fund of specialized information has been acquired. This information is at your service. For help in solving *your* filtration problem, whether the requirement is clean air, gas, or liquid, contact your Dollinger representative, or write direct, c/o the Dollinger Testing Laboratory.

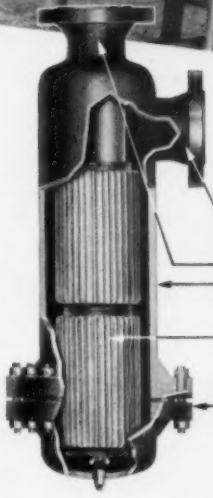

Diagram and Specifications of STAYNEW FILTERS in Service at Garvin County Plants

- Inlet.
- Outlet.
- Forged steel shell, 7/8 in. thickness, certified for 800 lbs. pressure.
- Radial Fin Filter Inserts. Removable by simply unscrewing wingbolt after unbolting head.
- Bolted Head, 32 in. x 3 1/2 in. flanges.

Wt. 3425 lbs.

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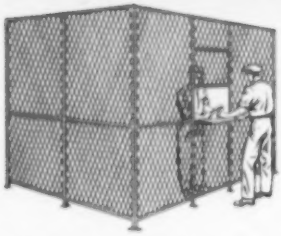
TOOLS AND EQUIPMENT WITH ACORN WIRE MESH PARTITIONS



● **Provide Positive Protection**

Acorn Wire Mesh Partitions, by enclosing tool cribs and stock rooms, prevent tool and parts pilfering, give tight control of tools, material and personnel in these areas. Divide large open spaces into efficient, separate departments, cut down confusion. Cost much less than solid walls, permit passage of light, air, sound and heat

● **Simple, Quick to Erect**

Made in inexpensive standard panels in two designs, Acorn Wire Mesh Partitions are easy to erect, take down, or move anywhere, with no need to move radiators or lights. Can be added to, or reduced in size. Doors can be moved, and corners made quickly to meet changing needs.

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COCHRANE MULTIPORT RELIEF VALVES
COCHRANE CORPORATION • • PHILADELPHIA 32, PA.

(Continued from page 75)

cludes capacity tables, dimensional data, specifications, layout drawings. Simplex Valve and Meter Co.

258 General Service Valves—Bulletin E-160, 16 pp, describes and illustrates the design and construction of company's quick-operating valves, explaining their application to blow-off service and on fire protection, chemical process, soot blower, water column blow-down, and other types of pipe lines. Included are tables of dimensions, weights and list prices. Everlasting Valve Co.

AIR CONDITIONING, HUMIDIFYING

259 How Conditioning Units Can Help—The advantages of self-contained conditioning units in cooling, dehumidifying and cleaning are given in illustrated Catalog 1207, 40 pp. Explains installation and operation. Includes complete engineering data on direct expansion cooling, cold water cooling, hot water heating, steam heating. Also includes speed and horsepower tables, dimensional data on both horizontal and vertical types, pyschometric chart and typical problems involving choice of unit size, number of rows of coils, determining speed and motor horsepower. Clarage Fan Co.

260 Humidifiers—Illustrated Bulletin 1772 covers line of steam humidifiers, including two new air-conditioned models. Includes discussion of dry air problems, tables on desirable relative humidities and regain of hygroscopic materials, complete data on operation and installation of both electric and air-controlled types. Also tells how to select humidifiers, giving capacities, prices. Armstrong Machine Works.

TOOLS, WELDING

261 Pipe Tools, All Kinds—Catalog 50, 36 pp, covers entire line of pipe tools, machines, power drives, threading oil. Products are illustrated by photo and operational advantages fully explained. Includes concise ordering specifications, current price list. Beaver Pipe Tools, Inc.

262 Tool Catalog—Company's complete line of hand and power tools, tool sets, kits and related equipment is presented in Catalog T, 110 pp. Illustrated with photos of all items listed, it describes tools, includes sizes, applications, shipping weights. Snap-On Tools Corp.

263 Welding Electrode Ordering Guide—Here's a handy pocket-size booklet, Catalog R7-7, filled with information covering electrodes for hard surfacing and for welding stainless steels, alloy steels and mild steels. Includes operating characteristics, sizes, current ranges, tensile strengths, polarity. Harnischfeger Corp.

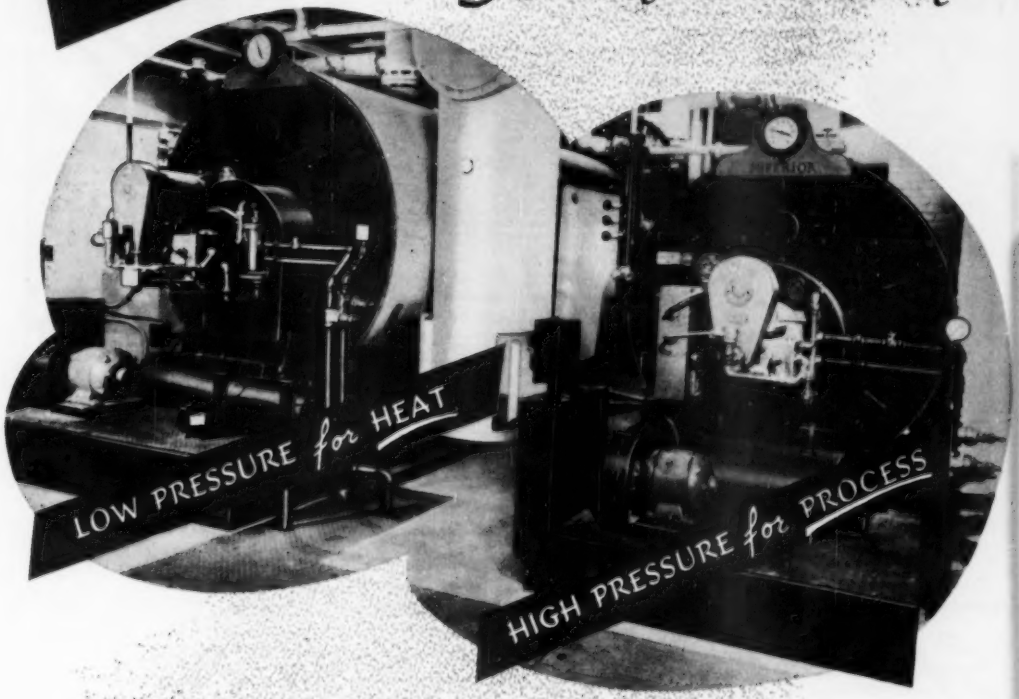
264 Welding Outlets—Catalog and Engineering Reference Book W-2 presents company's line of welding, threaded and socket outlets and tank flanges. In addition to full ordering information, it includes a general description of the various outlets, discusses their advantages and provides illustrated instructions for installing them. Includes temperature-pressure ratings and material specifications, photos of installations. Bonney Forge & Tool Works.

FITTINGS AND FLANGES

265 Tube Fittings Selection Guide—Bulletin 342A contains at-a-glance factual data on brass fittings for use with copper, aluminum, brass, steel and other metal tubing. Provides—in tabular form—assembly and cut section views of several fittings, an explanation of methods of assembly, tubing for which fitting is suited, size range, applications and advantages, as well as illustrations of stock types available. The Imperial Brass Mfg. Co.

266 Handbook on Fittings and Flanges—Catalog wf-1950, 88 pp, is packed with working information on manufacturer's seamless carbon steel welding fittings and forged steel flanges. In addition to presenting standard schedules with their specifications, list prices and sizes, this

Superior at the PHILADELPHIA Textile Institute



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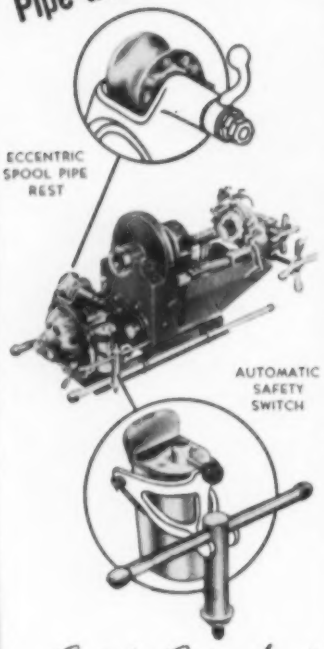

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book gives information on dimensional tolerances; American standards flange facings with dimensions; thread standards and threading practice; service pressure ratings, physical and chemical requirements for flanges, nuts and bolts; plus sizes and wall thicknesses of welding fittings stocked. Grinnell Co., Inc.

OTHER EQUIPMENT

267 Four Handy Guides for Plant Engineers—Bulletin 20B 6051J, 12 pp, offers data on figuring V-belt drives; Bulletin 51B 6025K, 12 pp, for quick selection of electric motors; Bulletin 52B 6059E, 16 pp, for selection of centrifugal pumps, and Bulletin 25B 6150B, 32 pp, for a description of equipment for power generation, distribution and control. Any or all of these booklets are available—specify those wanted. Allis-Chalmers Mfg. Co.

268 Rubber Products Reference Book—This is a collection of data covering all types of hose, belting, packing and other rubber products manufactured by company, including work gloves and helmets, linings, and hard rubber items. Fully illustrated, provides descriptions, specifications, recommended applications. The B. F. Goodrich Co.

269 Shock Absorbers for Machines—This folder describes and illustrates a vibration isolating and shock absorbing material recommended for use as machine mounting or as component parts. Explains how material functions and how it is installed. Fabreeka Products Co.

270 Modern Steam Engines—In presenting steam engines as more than "just drives," Bulletin 306 touches briefly upon some of the advantages of "by-product" power. Bulletin features company's vertical steam engines of both throttling and automatic governor types. Sectional drawings are accompanied by engineering data, an illustrated discussion of construction features and photos of installations. Troy Engine & Machine Co.

271 Welding Fume Collectors—Bulletin 37-D describes and illustrates fume collecting equipment for welding operations. Discusses advantages of collecting fumes at the source, hood protection, good working range, easy installation. Illustrates regular, long-reach and special collectors, giving dimensions and application information. Also describes ventilated welding cabinet. Ruemelin Mfg. Co.

272 Vacuum of Many Jobs—Bulletin 144, 20 pp, describes and illustrates 132 unusual industrial uses for company's vacuum system. Applications, listed alphabetically, range from the removal of dust from inside of rolls of adhesive tape to recovery of zinc dust. The Spencer Turbine Co.

273 Positive Displacement Blower—Publication 84 presents an axial flow, high speed blower for handling gas or air under pressure or vacuum from 20 to 15,000 cfm. Photos show complete unit, principal parts. Discusses advantages, lists applications, gives specifications. The Standard Stoker Co., Inc.

274 The Why, What and How of Lubricants—Here's a 20-pp booklet explaining the commonly used tests and terms describing lubricants. Covers viscosity, flash and fire, neutralization number, penetration, specific gravity, extreme pressure, steam emulsion, corrosion. Includes glossary of 100 lubrication terms and lists products manufactured by company. Although factual, book is written in layman's language and illustrated with drawings showing the various tests as well as amusing sketches which interpret their meanings. Tide Water Associated Oil Co.

275 Metal and Asbestos Gaskets — This 32-pp catalog covers company's stock gaskets of all types as well as gaskets fabricated to specifications. Illustrated with photos, it includes full specifications, dimensions, application data. Also contains engineering data helpful in estimating gasketing needed. United States Gasket Co.

276 Reference Bibliography on Chemical Proportioning—Bulletin CAT lists more than 50 bulletins and reprints of articles published by manufacturer on the general

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subject of constant rate and flow responsive proportioning. Covers equipment, methods, uses. ✎ Proportioneers, Inc. ✎

277 Steam Power Plant Auxiliaries—In Vol. 36, No. 4 of Lubrication, a technical publication on selection and use of lubricants, is an article of recommended lubrication practices for steam power plant auxiliaries. Illustrated with photos and sketches, it discusses automatic coal firing machinery, stoker design, pulverizers, and blowers, external reciprocating elements of pumps and compressors. The Texas Co.

278 Underfeed Stokers—Manufacturer's underfeed stokers for loads from 100 to 360 developed hp, and those designed to carry loads up to maximum usually required of a single retort, ram type, side dump underfeed stoker, are presented in Bulletin SB 27. Illustrates, by photos, and explains construction and design details; gives dimensions. Erie City Iron Works.

279 Plant-Wide Water Service—Titled, "Let's Consider Your Whole Water Problem," this booklet analyzes water problems from four standpoints—procurement, treatment, usage and disposal—and explains how company is prepared to offer technical service in solving problems related to all four. Hall Laboratories, Inc.

280 Floor Care Booklet—The problem of safety and polished floors is presented in an illustated booklet called, "Mr. Higby Learned About Floor Safety the Hard Way." It suggests methods by which floors can be polished and still be safe and how housekeeping costs can be cut. Walter G. Legge Co., Inc.

281 Electric Stairways—Bulletin B-4403, a 50-pp illustrated manual, tells who can expect to profit by using manufacturer's electric stairways, what their advantages are and how they can be incorporated in plant design and plans. Filled with photos of installations, it also describes and illustrates operating mechanism of the escalators, discusses their safety, maintenance. Elevator Div., Westinghouse Electric Corp.

282 Walkways and Loading Racks—A 36-pp data book filled with photos of installations and application suggestions. Part 1, Section 8 of Catalog 54 presents pre-cut steel material for on-the-job erection into walkways, stairways, loading racks. Gives instructions covering the use of the units and includes layout diagrams and parts lists for the installations pictured. Black, Sivalls and Bryson, Inc.

283 Small Scaffold—The merits of a small sized swinging scaffold for painting and other light-duty work are stressed in illustrated Bulletin C.P. 34. Explains safety features, tells how scaffold is used. The Patent Scaffolding Co., Inc.

284 Technical Data on Controls, Control Valves—Technical information and solution to problems involving the use of pressure switches—or any application where it is necessary to convert pressure or vacuum changes into electrical action—are available from this company. Data also available on use of four-way solenoid valves for control of air, water and light oil in pipe sizes of ¼, ⅜, ½ and ¾ in., up to 150 psi. Barksdale Valves.

285 Steel Work Benches—Form 701 is an ordering guide for work benches, illustrating models and providing explanation of features as well as listing dimensions and specifications and available top materials. Also gives ordering data on drawer tiers, continuous benches, bench tops, parts and accessories. Standard Pressed Steel Co.

286 Phone Booths for Noisy Spots—Bulletin 184 provides photos of several of company's floor and wall model phone booths designed to permit telephone conversations in factories, utility plants, commercial buildings. Stresses advantages and versatility of the booths and describes and pictures construction. Burgess-Manning Co.

287 Plexiglas Applications—This booklet illustrates many of the ways Plexiglas is now being used. Also gives physical properties, sizes and descriptive information about this acrylic plastic in sheet and rod forms and discusses molding powders and their use. Rohm & Haas Co.

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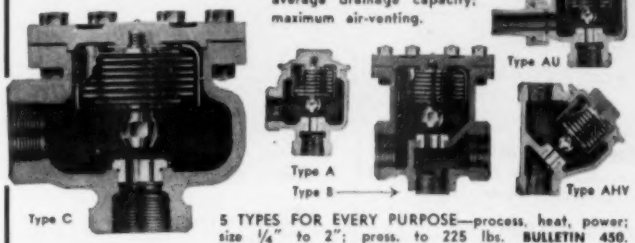

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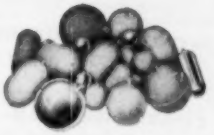

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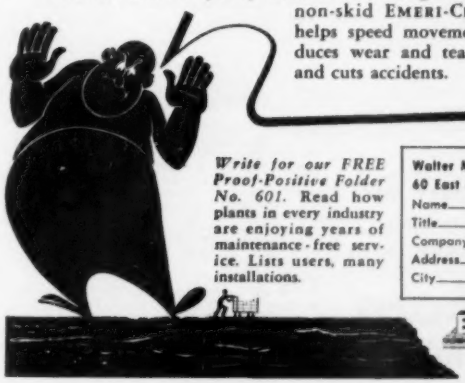

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BULLETINS

(Continued from page 78)

171 Electrons at Work—What goes on inside electronic calculators is described in this interesting 16-pp booklet. Briefly, it shows how electronic tubes are put to work in high speed machines to perform complex arithmetical computations. How an electronic tube functions and how the binary system of numbers is utilized in electronic calculations, are explained, as are the operating principles of electronic counters, amplifiers, switches and timing controls. Seven of company's machines—including the calculating punch and card-programmed calculator are described and illustrated. International Business Machines Corp.

172 Gas Scrubbers—Performance data on company's Pease-Anthony gas scrubbers of both the cyclonic and venturi types for the removal of both micron-sized and dusts and sub-micron dusts, fumes and mists, is presented in Chemico Bulletin M-102. Describes both types of scrubbers, giving advantages and illustrating typical installations. Chemical Construction Corp., Unit, American Cyanamid Co.

173 Airless Blasting—What It Can Do—Plant engineers interested in airless abrasive blast cleaning will find the answers to many of their questions in 24-pp Catalog 74-B. It explains company's method of airless blasting, describes various types of machines available, and discusses the application of this process to metal cleaning, finishing and shot peening problems. Typical parts cleaned are pictured, along with actual installations of the various types of equipment. Text is amplified by photos, line drawings and diagrams. American Wheelabrator and Equipment Corp.

174 Proportioning Oil Burner—Featuring the eight major operating advantages of company's proportioning oil burner, Type BI, Bulletin 501 also provides dimensions, capacity tables, shutter and support data. Illustrated with typical layouts and installations. The Anthony Co.

175 Colloidal Graphite in Metalworking—Among the properties of "dag" colloidal graphite dispersions are their lubricant quality and resistance to heat. These properties are explained and compared with those of other graphite lubricants and other types of lubricants under conditions encountered in the metalworking industry in Bulletin 426. Instructions are given for the use of Aquadag, Prodag, Oildag and Glydag in forging, wire drawing, piercing, extruding, die casting, bending and other operations. There are also instructions for its use in cutting and on high speed precision tools. Acheson Colloids Corp.

176 Refractories for Steel Mills—Bulletin M-5042 describes in detail the physical properties and applications of company's K-99 refractories developed for linings in blast furnaces, hot metal cars and hot metal mixers. Discusses refractory's fusion temperature, CO disintegration, apparent porosity, strength, toughness, burning temperature, resistance to slag and other characteristics. Some of company's other refractory products are also described. A. P. Green Fire Brick Co.

177 General Plant Equipment—Maintenance Catalog 550, 36 pp, presents a wide range of power transmission equipment, as well as slurry pumps, water valves, roller holdbacks, perforated screens and elevating conveyors. All equipment listed is for heavy duty service. Complete descriptions are provided, supplemented with photos, dimensional drawings, data tables and specifications. McNally Pittsburgh Mfg. Corp.

178 Air for Power—Catalog 105 illustrates 29 types and 14 sizes of air operated vibrators, valves and fittings that have a wide range of application for shaking and settling materials. Explains how vibrators operate and the many functions they serve. The Cleveland Vibrator Co.

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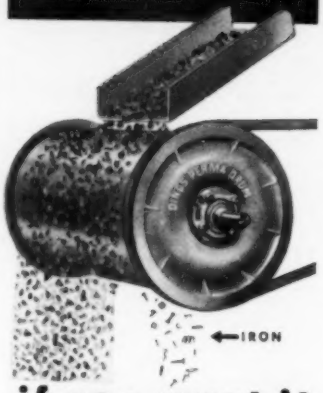

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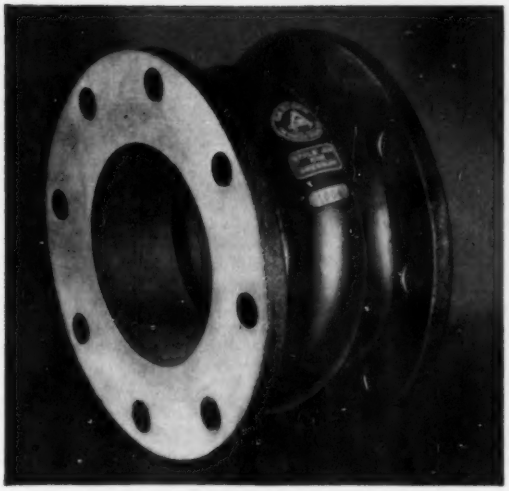

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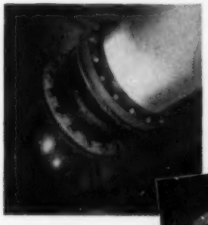

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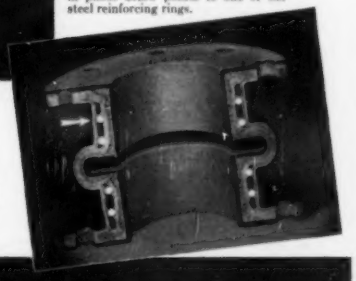

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NEW BOOKS reviewed for the plant engineering staff

Industrial Lighting Reports

Lighting Reports for Flour Mills and on Practices of Daylighting. Size 8½ by 11 in.; paper bound. Published by Publications Office, Illuminating Engineering Society, 51 Madison Ave., New York 10, N. Y. Price 50 cents per copy of each report.

LIGHTING FOR FLOUR MILLS. This 8 page, illustrated report has been prepared as an aid in increasing mill efficiency and production and to add to comfort and proficiency of employees. This new report is based on surveys of lighting in existing flour mills and on trial installations. Recommendations include a table of lighting levels in various work areas from the roll floor and other processing departments to inspection and final weighing and bagging, all based on recommended practices of the Society. Lighting levels for offices and laboratories are also included.

RECOMMENDED PRACTICE OF DAYLIGHTING. This 36 page, illustrated report discusses in detail prescribed means for the utilization of daylighting in building design. An introductory section describes design principles for windows, shows illumination distribution in rooms; includes tables of solar position in various latitudes. The report also recommends window arrangement; control media, such as louvers, blinds and glass blocks; treatment of reflecting surfaces of work areas in plants, offices, schools and homes.

For the Test-Tube Engineer

INDUSTRIAL CHEMISTRY, An Elementary Treatise for the Student and General Reader, by Emil Raymond Riegel. Fifth Edition; 6½ by 9¼ in.; 1015 pages; illustrated; cloth; published by Reinhold Publishing Corp. Price $7.00.

THIS IS THE fifth edition of this famous book. Although it deals with the general subject of chemistry, it should be of interest to engineers of various types. Many plant engineers, aside from their primary interest in the chemistry of feedwater and fuels, are interested in certain industrial processes and this book gives a description of many of the more common industrial processes in a way which even a layman can readily understand.

The new edition has been largely rewritten, expanded and brought up to date. New material, not represented in the previous edition, includes antibiotics, the new organic insecticides and fungicides, the utilization of wood, novel methods of the application of dyes to fiber, atomic energy and recent developments in plastics and petroleum.

The book should serve as a valuable reference book for chemical technologists and specialists, who will need it to learn what is going on in other broad chemical fields where ready access to new and outstanding developments is needed.

Working Principles of Power Capacitors

POWER CAPACITORS by R. E. Marbury, First Edition; 6¼ by 9½ in.; 205 pages; illustrated; cloth. Published by the McGraw-Hill Book Co., Inc. Price $3.50.

THIS BOOK covers the fundamental working principles of capacitors, the materials used in the manufacture of power capacitors, and the characteristics of the completed units. It traces history and development of power capacitors and their applications to power systems.

The basis of rating power capacitors and their operating limitations are also covered, as are types of capacitors commonly manufactured and their respective fields of application. Selection and use of fuses and breakers to function with capacitor units, and the merits of different means of automatically switching capacitor banks with reference to system requirements are also discussed.

This book should help the industrial

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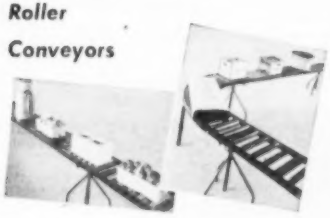

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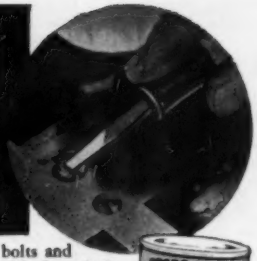

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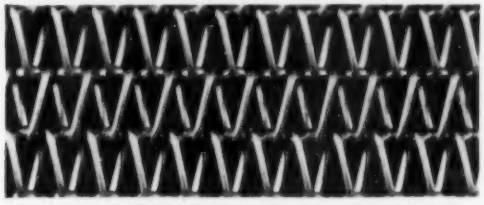

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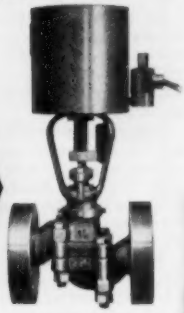
A REMOTE CONTROL VALVE FOR

★ HIGH LINE PRESSURES
★ LARGER LINE SIZES
★ CORROSIVE AND EROSIVE FLUIDS

THE NEW **ANNIN** SERIES 1520 **REMOTE CONTROL VALVE**
ELECTRO-PNEUMATIC SOLENOID-OPERATED

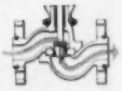


Service Range: Pressures to 3000 psi; Temperatures: —300° F to 1000° F
Sizes: ¾" to 4"

Now you can have efficient remote fluid control in your plant at a reasonable cost. In the past, perhaps you have been limited by the size and maximum pressure ratings of solenoid valves or by the excessive cost of special alloy valves in erosive and corrosive service. If such has been the case, the obvious solution to your remote control valve problem is the new ANNIN Series 1520!

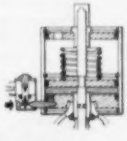
Here's why-

EXCLUSIVE SINGLE-SEATED VALVE BODY



Separable valve body with Teflon or other synthetic valve plug seating surfaces will withstand up to 3000 psi. Valve trim and plug can be replaced without removing valve from the line. Smooth internal flow channel, completely devoid of shoulders, pockets and threads, minimizes pressure drop across valve and facilitates handling of slurries or sludges. Available in Durimet 20, 316 Stainless Steel, Hastelloy, Zinc-free Bronze, Carbon Steel and almost any other castable alloy, this valve will give outstanding service under the most severe fluid conditions.

POWERFUL ELECTRO-PNEUMATIC OPERATOR



By introducing a secondary pressure system such as compressed air to the remote control system, ANNIN has utilized a sealed piston and cylinder arrangement for powerful valve action. This operator may be controlled by a 3- or 4-way solenoid pilot valve, a 3-way manual valve, or arrange for two-position direct-operation from any pneumatic, hydraulic, or electric-automatic control device. This flexibility plus the fast, shockless operation of the operator and valve, finds application in all types of remote control valve service.

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plant engineer to gain a better understanding of the significance of power factor and the gain to be made by the proper use of power capacitors to improve power factor. It gives the utility and operating and maintenance engineers useful information on the gains that can be realized by raising the system power factor or the power factor of specific circuits.

Electrical Machinery and How it Works

ELECTRICAL TRANSMISSION OF POWER AND SIGNALS by E. W. Kimbark. Size 6½ by 9 in.; 461 pp; illustrated; first edition; cloth bound. Published by John Wiley & Sons, Inc. Price $6.00.

THIS EXCELLENT book is different from most books dealing with the electrical transmission of power because it presents the basic theory of transmission lines together with applications to the three fields of power, telephony and ultra high frequencies.

While the book is intended as a text for junior or senior students in electrical engineering, it should also be of great value and interest to practical electrical engineers.

The material is arranged with the assumption that the students will have had the usual courses on a-c and d-c circuits, with lumped-parameters but none on electrical machinery or on electron tubes. This text will give them their first detailed treatment of circuits with distributed parameters.

Know Your Symbols

GRAPHICAL SYMBOLS FOR HEAT-POWER APPARATUS, ASA Z32.2.6-1950. Size 8½ by 11 in.; 5 pp; paper bound. Published by The American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y. Price 35 cents a copy.

THIS COMPILATION of 44 graphical symbols for heat-power apparatus has been approved by the American Standards Association.

Many leading power companies and their representatives throughout the country were consulted and a careful study was made to avoid conflicts with symbols being assembled by committees in allied fields. Clarity, simplicity, and nation-wide acceptance were basic considerations in assembling the symbols. Several symbols that are being used only in limited areas were omitted.

A Case Study of Nickel

NICKEL AND ITS ALLOYS, National Bureau of Standards Circular 485. Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 50 cents a copy.

THIS CIRCULAR, containing 72 large double-column pages, is a systematic and readily accessible summary of information about nickel. It combines information obtained by the Bureau in its own investigations with that available in published records of work done elsewhere. Particular attention is given to the physical and mechanical properties of nickel and its ferrous and non-ferrous applications.

Information on nickel in this publication includes sources; extraction, recovery, and refining processes; metallography; chemical properties; physical properties; mechanical properties at different temperatures; and casting, fabricating and miscellaneous processes. Many ferrous and non-ferrous alloys are listed, and their properties such as density, thermal conductivity, tensile strength, magnetic properties, and corrosion resistance are discussed.

Design of Steam Power Plants

STEAM POWER PLANTS by Philip J. Potter. First Edition; 6½ by 9¼ in.; 497 pages; illustrated; published by the Ronald Press Co. Price $6.50.

THIS NEW BOOK is particularly designed to give young engineering graduates a thorough ground work in the fundamentals necessary in the design of steam power plants.

Because of the author's aim to present fundamentals, no attempt has been made to illustrate all of the various designs of equipment that are available on the market, nor to compare similar designs of competitor manufacturers.

After a student has mastered basic principles, the author believes that he can readily learn trade differences during the early years of his industrial

(Continued on page 94)

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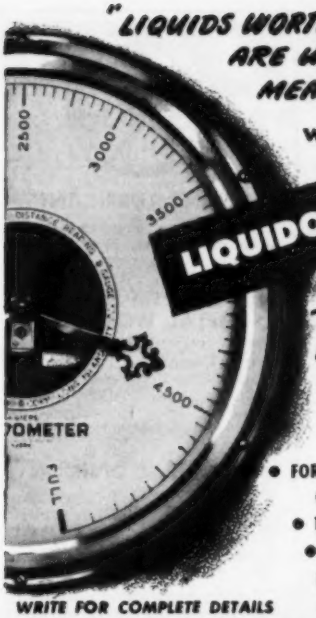

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CLOSING TYPE FIG. 4831

For emergency shut-off of inflammable liquids or to divert water or steam to fire mains.

OPENING TYPE FIG. 4721

For diversion of water to sprinkler deluge or water curtain system or to divert inflammable liquids to a point of safety.

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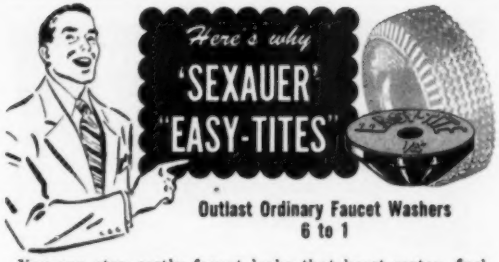
for everlasting protection



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Silicone Greases

(Continued from page 44)

operating at 200-300 rpm in a drier at 350 F has been reduced from once a day to once in several months. In textile mill drying cans, that operate on saturated steam journals at 400 rpm, Silicone Grease No. 44 has exceptionally long life. One textile mill reports that there have been no drying can bearing failures since they started to use Silicone Grease No. 44 more than thirty months ago. See Fig. 2.

"Cartridge" type ball bearings prelubricated with No. 44, light, are available from several of the leading bearing manufacturers. These bearings are usually identified by black metal shields. They are used and widely advertised to give 5 years of service without relubrication by one of the largest manufacturers of electric motors.

Both test and application data include that bearings properly designed and lubricated with No. 44 will give trouble-free service for the life of various instruments. The cost of permanently sealed bearings prelubricated for life may be more than offset by simpler mountings involving less costly machining. Even if conventional mountings and standard bearings lubricated with No. 44 are used, the cover plate can be sealed to the housing and the grease fittings can be plugged to eliminate the attendent dangers of over-greasing and dirt contamination.

Valve Seal A is a translucent and colorless silicone grease developed as a lubricant for plug valves and flow meter bearings exposed to corrosive chemicals, high temperatures or both. Its physical properties are given in Table I.

The heat stability of this compound is demonstrated by its performance in four Stellite treated valves handling hydrocarbon gases at 392 to 932 F for about 21 hr each day. During the remaining three hours, temperatures range from 932 to 1292 F. Three years of experience have proved that valves lubricated with this material need not be reground. Valve life has been tripled; the cleaning schedule has been reduced from once every 4 to 6 weeks to once every 6 to 8 months. And there is evidence that less expensive valves can be used.

It has been used effectively in valves handling such materials as acetic acid, acetone, methyl alcohol, isopropyl alcohol, formaldehyde, 93 per cent sulfuric acid, furfural, phosphoric acid, carbon disulfide, hot water and steam. It is also used in the packing of pumps handling such corrosive materials as a sulfuric acid solution of ammonium sulfate. In such services, it reduces maintenance costs and reduces the hazard of frozen or inoperable valves and leaky pumps. Typical uses are shown in Figs. 3 and 4.

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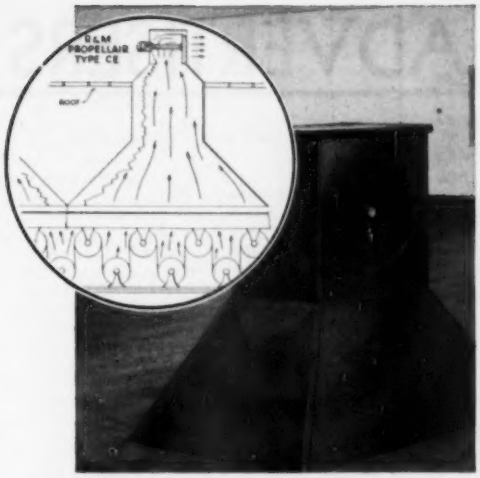

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career. For this same reason, descriptions of equipment have been kept to a minimum and discussions of empirically designed apparatus, such as coal and ash handling systems have been omitted.

While the book is designed primarily for students, engineers in industry will find this text very useful.

Testing for Stress and Strain

PHOTOELASTICITY Principles and Methods by H. T. Jessop and F. C. Harris. Size 6 by 9¼ in.; 184 pp; illustrated; cloth bound. Published by Dover Publications, Inc. Price $3.50.

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This work offers researchers and engineers an opportunity to learn the latest, time-saving methods of checking calculations in two-dimensional design problems. In addition, it describes the relatively new techniques by which stresses in three dimensions can be checked.

Humidity Control

(Continued from page 37)

latent heat of evaporation, the water originally picked it up to become vapor, and must now get rid of it in order to become water again. Conceivably, air can enter an adsorbent drier at say 90 F, and emerge sans water vapor, at 100 F.

If we want to figure out the heat rise ourselves, all we need do is pick up a psychrometric chart, jot down the moisture content in grains of water of the air entering the drier, then subtract the moisture, also in grains, of the air leaving the drier. The difference, which is the grains of moisture condensed per pound of air, need be multiplied only by the total pounds of air per hour for the total weight of water in grains, then divided by 7,000 to convert grains to pounds. Next multiply the pounds by 1,000 Btu, which is the approximate latent heat of evaporation for water in air, and we have the total heat turned loose on the world by the drier. As 0.24 Btu will raise the temperature of air 1 degree F we know how many pounds of air per hour are leaving the drier. A little simple arithmetic shows us the rise in temperature, like this:

$$\frac{\text{Total Btu}}{0.24} = \text{Total Degrees.}$$

$$\frac{\text{Total lb}}{\text{Total Deg}} = \text{Deg Added per lb}$$

There is still an easier way to find the temperature rise: we can ask the manufacturer of the drier.

Calculating the amount of moisture to be added, if our problem is humidifying, is just as easy. With the psychrometric chart, we can readily set down what we have and what we want, and the difference in grains is the amount of water we must add.

Temperature control is inevitable with humidity control, because relative humidity changes at once if the temperature moves either up or down. With some commercial equipment, discharging conditioned air into a definite space results in complete control, governed at the machines. With units that are strictly driers, some consequent cooling may be desirable. It is up to us whether we cool with cold water coils or refrigerated coils. There are several ways of doing practically everything.

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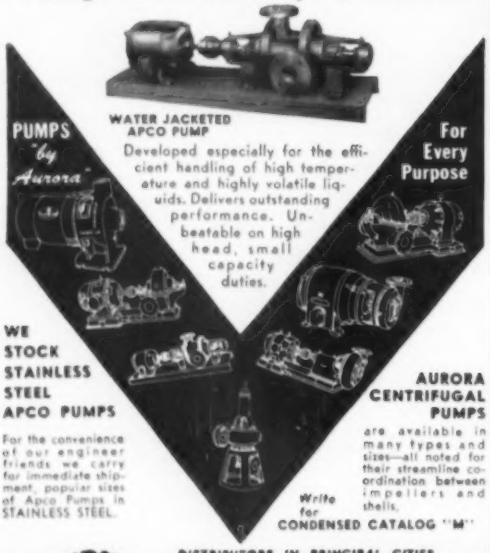
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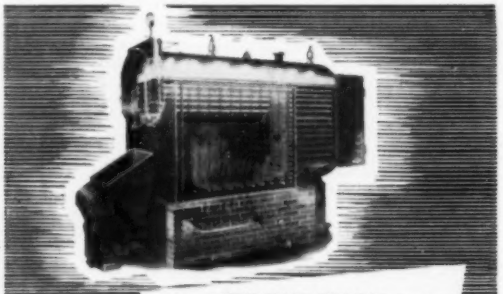

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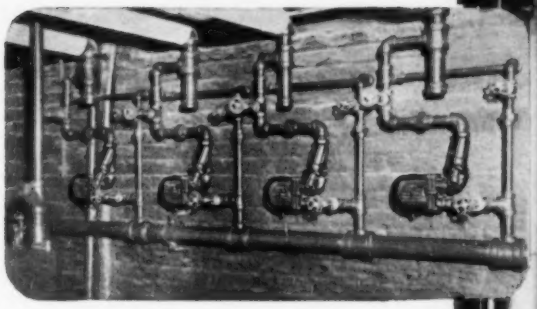

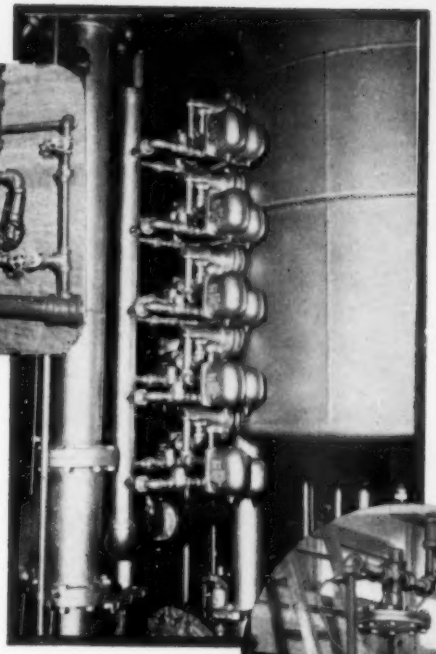

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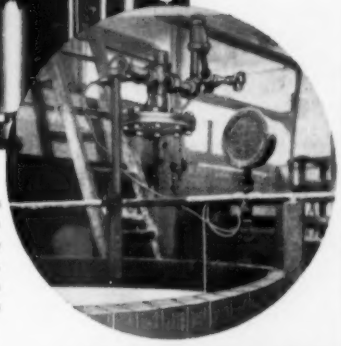

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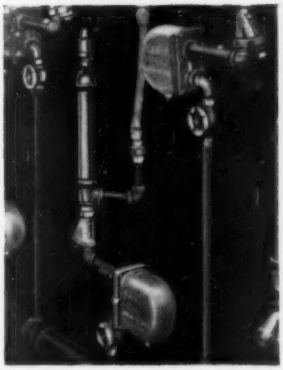

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